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A COMPENDIUM OF

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COMPRISING THE

Origin of Many Things Not Generally Known.

COMPILED AND ARRANGED BY R. M. WASHBURN.

FIFTH EDITION.

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PREFACE.

THE verdict of the reading public (whose judgment is best and final) on the value of former editions of this work has convinced the collater that he has struck the key-note to the popular mind. Brevity and conciseness are the distinctive features without detraction from the importance or the reliability of the subjects treated. There is no end to the making of books, but that the compiler of this has supplied a want long felt is attested by numerous and unsolicited testimonials; and, stimulated by a desire to make the new edition more complete than its predecessors, I have given not only the origin and history of the earlier important discoveries and inventions, but those of more recent date, including some of the most startling in the annals of the nineteenth century. The work is not designed nor intended to occupy the entire province of an encyclopedia; its aim is to be well compacted rather than exhaustive. With due regard to the value of the standard encyclopedias, their cost places them above the reach of many, while the expansive treatment of the different subjects is not the desideratum of that class of readers who prefer "a running banquet that hath much variety but little of a sort." This is a rapid age and people desire concentrated knowledge, the cream and siftings of selection. The busy cares of life and other causes have hindered many from gaining information on subjects of interest to them; and it has been my object to winnow the wheat from the chaff, in the great mass of statistical, historical, and descriptive information contained in standard works, and compress such instruction as is of use and interest into form the most convenient for speedy reference, but yet containing a sufficiency of detail to reward the studious reader. Whether consulted by the man of business, the student, mechanic, housewife or child, the book will prove a source of infinite pleasure and profit. To those seeking information of a practical nature the selection, variety and arrangement of subjects can not fail to provide a fund of knowledge not easily obtained in similar form. As indicated by the title the book is a library in itself, and as such may confidently be commended to the acceptance of the thinking public.

R. M. W.

APRIL 1, 1889.

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Thos. A. Edison.

THE PEOPLES'

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LIBRARY.

EDISON AND HIS INVENTIONS.

Lindlay Murray truly said in his old English Grammar: "This is an age of progress." The evening of the 19th century is crowned with more wonderful discoveries and inventions than ever before marked any period of like duration in the history of the world's progress. It is fitting therefore that we should select for the opening pages of this work a theme and a personage characteristic of the age. One of the most remarkable inventors and discoverers of the present day is Thomas Alva Edison. He was born in Milan, Ohio, February 11, 1847. At that time Milan was a place of considerable commercial importance, but the construction of the Lake Shore Railway a few miles south of the town ended its prosperity. He played upon the banks of the Huron and rambled about the country like any other country boy and perhaps exhibited but few of the traits that marked his maturer years except a preference for the construction of miniature plank roads, villages and play things of his own designing.

When young Edison was seven years old the family removed to Port Huron, Michigan. Thomas was a good student and his mother, who had been a successful teacher, in her younger days faithfully guided his studies. When only ten years of age he read with avidity some of the best historical works.

When 12 years old he secured a position as train boy on the Grand Trunk Railway and began to earn his own living. He was quite successful and among other exploits combining profit and amusement, he printed a small paper of his own on the train which commanded ready sale. He also fitted up a laboratory with chemicals of various kinds where he pursued his investigations in a crude way until one day the car was ignited from a bottle of phosphorus accidentally overturned and the irate conductor pitched Edison and all his traps off the train. He gathered up the wreck, renewed his stock and pursued his investigations at home. His genius was inventions even in boyhood days. He made a small steam

engine and other pieces of mechanism. But his mind soon began to interest itself in electrical and chemical researches. He rigged up a short telegraph line to a neighbor's house, which worked successfully. He soon afterwards rescued the little child of the station master at Mount Clemens, Michigan, from the peril of an approaching train. The grateful father taught young Edison the mysteries of telegraphing and at sixteen he was in charge of his first office at $25.00 a month.

His subsequent career as an operator we need not follow in detail. He was at once a good and a poor operator. He rapidly became skillful as an operator but his thirst for knowledge and fondness of experiment often tempted him to neglect his routine work. In telegraphing, as in every other avocation "business is business" and the operator cannot well excel in the performance of his clerical duties and at the same time push his studies and experiments as Edison did. His first office was Port Huron, Michigan. He filled positions at Indianapolis, Cincinnati, Louisville and Memphis. He finally turned up in Boston, where a pleasant anecdote is located concerning his first appearance as a "gawky" stranger of whom the operators were disposed to make not a little fun. But he quietly sat down to his task to work the most difficult wire, where many of his predecessors had found it exceedingly difficult to keep up with the fast sending indulged by the New York operator at the other end of the circuit. But Edison was equal to the emergency and rapidly rose to prominence. Here he began to give his inventive powers some scope. He opened a shop for repairs, and improvement of electrical apparatus. He invented a dial telegraph instrument and put several into use. He also made a chemical vote recording apparatus, a private line telegraph printer, and partially completed his duplex instrument which had long been a favorite study with him. In 1870 he removed to New York and there began the career as an inventor which has since made him so famous. Since that date and up to the present writing Mr. Edison has made out of his inventions half a million of dollars, and, it should be added, has spent that amount pushing his investigations in a thousand different directions. He removed to Newark, N. J., and established a large manufactory and laboratory where he brought out many of his most profitable inventions. In 1876, to escape the intrusion upon his time of the many visitors who called from curiosity and other motives to see him and his wonderful inventions, he removed to Menlo Park, N. J., a retired place on the line of the New York and Philadelphia railroad 24 miles from New York City. There he built what is probably the most extensive laboratory in the world. It is undoubtedly equipped with the most complete assisting machinery, tools and appliances of any experimental shop to be found in either the old or the new world and from its magic recesses there comes forth nearly every day some new discovery or invention to interest the world and help on the great struggle of humanity to lift itself to a higher plane of intellectual activity and to probe the mysteries of the physical world. There he has his corps of trained assistants, men who are skilled iu their specialties as electricians, chemists, mechanics and in every department of the arts and sciences. Under such a leader and with such appliances at his command and with all the capital that

his business requires it is not surprising that Edison is able to make more rapid progress than the poor inventor who struggles alone and unassisted. But what he has is the fruit of his own genius and persistence and the credit is all his.

The limited space of this work will not permit a detailed history of his inventions; we can only enumerate some of the more prominent and important.

The Duplex telegraph which transmits two messages in opposite directions over one wire at the same time. An improvement upon this is the Quadruplex which increased the capacity of a wire four-fold. The Button repeater, the Gold and Stock printer, the private line Printer, the Automatic telegraph, the Electric pen and press for duplicating copies of letters, circulars etc; the Domestic Telegraph system which was so popular in the leading cities before the advent of the telephone; the Telephone in a great variety of forms; the transmitter or Microphone for increasing the volume of sound in the telephone; the Megaphone, a peculiarly constructed ear-trumpet for deaf people; the Aerophone, to be operated by steam or compressed air for talking at long distances without the intervention of a wire or any other conductor of sound or apparatus but the instrument itself; the pressure relay, the Carbon and heostat, the Harmonic engine; multiplying copying ink; Vocal engine; the Tasimeter or minute heat measurer and hundreds of other minor inventions of more or less importance in themselves or as adjuncts to his other inventions. But two of the most notable of his inventions are the Phonograph and the Electric light. The phonograph is the most original and unique, perhaps, of all his inventions. The apparatus is very simple in construction. It makes no use of electricity. It is a revolving cylinder into which vocal sounds, uttered or sung, are so registered for reproduction and distribution, may be subsequently used to reproduce the tones in the very voice, tone, strength, volume, emphasis, inflection and accent with which they were uttered. In describing the uses of this instrument, Mr. Edison himself is quoted as saying: "First, for dictation, it will take the place of shorthand reporters. Instead of writing a man will talk them to the phonograph, and send the sheets directly to his correspondents, who will lay them on a phonograph and hear what they have to say. A first-class elocutionist will read one of Dickens' novels into the phonograph. It can all be printed on a sheet ten inches square, and these can be multiplied by the within copies by a cheap process of electrotyping. These sheets can be sold for twenty-five cents each. It will sing in the very voice of a Patti, so that every family can have an opera any evening. It can be used to make toys talk. A company has already organized to make speaking dolls. They will speak or sing in a little girl's voice."

The electric light seems associated with the name of Edison. When he went to work at the electric dynamo, or generator of electric force, too much had been done to admit of his doing much pioneer work. His proper mission was to perfect. His labors were directed to removing from the dynamo all surplus wire not useful for purposes of generation, and avoid unnecessary internal resistance in the machine, and the consequent excessive accumulation of heat. Two methods, from the first, have been in use for producing electric light, viz: the arc and the incandes-

cent. Edison, after experimenting with many substances for carbon filament, finally fixed upon bamboo fibre. These fibres are pressed into U-shaped moulds where they are carbonized.

The largest central station for electric lighting is that of New York, managed by Edison. He has probably applied for and taken out more patents on his numerous inventions, than any other one person in this or any other country. If his life is spared the world may expect yet other wonders from the seemingly inexhaustible resources of his fertile inventive genius.

IRON.

Iron is the most useful of metals, not even excepting gold, and it is used in so many forms in medicine, in manufactures, and in the arts that it is difficult to imagine how the world could have ever done without it. Yet it is well known that many nations arrived at a comparatively advanced stage of civilization without the knowledge, at least without the use, of Iron.

The useful forms of iron are cast-iron, steel and wrought iron. The two former are compounds of iron and carbon, being carburets or carbides of iron. Cast iron has the larger proportion of carbon in its composition. Wrought-iron is nearly pure iron, but it has generally some trace of carbon sulphur, and phosphorus. The Bible speaks of Tubal Cain as the discoverer of Iron and the father of smiths, while the Egyptians made Hephaestus its discoverer. Pliny speaks of it as having been discovered on Mount Ida by the Dactyles, after the destruction of the forest by lightning, 1432 years before Christ. He ascribes the discovery of the blacksmith's forge to the Cyclopes.

Jeremiah and Ezekiel speak of iron and mention two qualities, one of which the latter calls bright iron probably steel. The same distinction is made by Hesiod (850 B. C.)

Moses mentions an iron furnace 1490 B. B., and Job speaks of iron as "taken out of the earth. The existence and uses of iron among the ancient Egyptians are pretty well proved by the paintings in which the iron and steel knives and sickles are distinguished from the bronze by the color; one being blue and the other a reddish brown.

Iron money was used in Sparta for many centuries after the time of Lycurgus. Iron money was also used in Britain prior to the date of its conquest by the Romans. Steel was very anciently used, its invention is ascribed to the Chalybes, who of old lived in the neighborhood of what has during the past year or two become the celebrated port of Batoum. The Britains, before the time of Christ, used to export Iron to Gaul, and after the Roman conquest the conquerors established extensive smelting works, which lasted till the Saxon conquest and probably after. Iron Bars were demanded by William the Conqueror, as tribute from the city of Gloucester. In 1355, Edward the III, forbade the export of Iron from England, and in 1483 the importation of articles which could be manufactured at home was forbidden. Bar Iron was made in the American colonies of England as early as 1622.

The tinning of iron was introduced from Bohemia in 1681. The first experiments in smelting with anthracite coal were tried at Mauch Chunk, Pa., in 1829, in France in 1827 and in Wales successfully by the aid of Neilson's hot-blast ovens in 1837. The experiment at Mauch Chunk was repeated with the addition of the hot-blast in 1838, 1839 and succeeded in producing about two tons per day. The Pioneer

furnace at Pottsville was blown July 1839. The first iron works in America were established near Jamestown, Virginia in 1619. In 1622 the works were destroyed and the workmen with their families massacred by the Indians. The next attempt was at Lynn, Mass., on the banks of the Sangus in 1648. The ore used was the bog ore still plentiful in that locality. At these works Joseph Jenks a native of Hammersmith, England, in 1652 by order of the Province of Massachusetts Bay, coined silver shillings, sixpences and threepences known as the "pine-tree coinage," from the device of a pine-tree on one face.

QUININE.

Quinine is an alkaloid found in the bark of trees belonging to the Cinchona or Peruvian bark family. It was first introduced into Europe about two hundred years ago by the Countess Cinchon, the wife of a Viceroy of Peru, and from her the bark takes its name. It was introduced into the United States about fifty years ago by Farr, the founder of the house of Powers & Wightman of the Quaker City. Before this the principal supply came from Paris. The annual consumption in the United States alone is from a million to a million and a quarter ounces.

GOLD BEATING.

The art of gold beating is a very ancient one. It seems highly probable that, like some other arts, it has been known and practiced and forgotten. Homer refers to it ; Pliny, more practical, states that gold can be beaten, one ounce making 550 leaves, each four fingers square — about four times the thickness of the gold now used. This is most probably such gold as was used in the decoration of the Temple : "It was covered with plates of burnished gold." The Peruvians had thin plates nailed together. It is possible that if decorations of this character were used in these parts, their insecurity would so trouble some folks that they would have no rest till they were effectually "nailed." The Thebans have in their wall histories some gold characters done with leaf said to be as thin as the gold of the present day. Coming down with a jump from the long past to the present age, we find our country celebrated for its gold-leaf. Italy used to excel us, but Italy has been in a long sleep, and is only just awakened. It is one of the last things our overgrown offspring undertook to make for herself. Until very recently she imported all the gold-leaf she required from this country. The gold-beater's skin made here is still the admiration of the world (of gold beaters). This skin is gut skin stretched and dried on frames, after which each surface is very carefully leveled, a labor intrusted to the delicate hands of young girls. A mould (as the number of square pieces of skin beaten at one time in the gold-beating process is called) is an expensive article, costing from £9 to £10, and when useless for gold beating, is still of some value. Fifty or sixty years back a workman made 2,000 leaves of gold from 18 or 19 pwts. of gold ; now, by better skin and skill, he is enabled to produce the same number from 14 or 15 pwts., showing a considerable reduction in the cost of produce, and, as may be expected, a deterioration in the quality of the article. One grain of gold beaten between this skin can be extended to some 75 square inches of surface, the

thickness of which will be 1.367650th part of an inch. The riband of gold is annealed or softened in the fire, and cut up into pieces of the size of a square inch, and 150 of these are placed by means of wooden pliers, between an equal number of leaves of vellum; each square of gold occupying the centre of each leaf of vellum. A parchment case, open at both ends, is drawn over this tool, or *kutch*, as the packet of vellum leaves is called, and this is enclosed in a second similar case, so as to cover the edges left exposed by the first case. This packet is then beaten with a sixteen pound hammer upon a smooth block of marble, strongly supported from below, and surrounded on three sides by a raised ledge of oak; the front edge is open, and has a kind of leathern apron attached to it for catching fragments of gold that may escape in the subsequent operations. The elasticity of the packet causes the hammer to rebound, and thus lightens the labor of the operator, and enables him to apply his blows with regular effect; every now and then, in the interval between two blows, he turns the packet over to distribute the force equally, and he occasionally bends the packet to and fro to overcome any slight adhesion between the gold and the vellum, and at intervals he opens the packet to see that the work is satisfactory, and also to re-arrange the relative positions of the squares of gold, by placing those near the surface in the centre, and placing these near the surface. The beating is continued until the one inch squares are spread out into four inch squares. Each piece of gold is then taken out, placed on a cushion, and cut into four pieces with a knife. These pieces are put between the leaves of another tool, called a *shader*, made of gold-beater's skin. The packet is enclosed in parchment, and beaten with a twelve pound hammer as before. The squares of gold are again spread out to nearly the area of the gold-beater's skin. The packet is again opened, the leaves of gold are again cut into fours, and each quarter is placed between two leaves of membrane as before. The gold in this case is divided by means of a strip of cane, since it has a tendency to adhere to a steel blade. The squares of gold now increased to 2,400 are separated into three parcels of 800 each; the squares of each parcel are again separated by gold-beater's skin, confined in the parchment cases, and beaten as before. These squares of gold leaf expand for the third time nearly to the size of the leaves of membranes, and have at length attained the required degree of tenuity. The process of attenuation can be carried beyond this, but the gold is apt to tear, and the process requires great extra care. The three beatings and two quarterings expand the gold to an area about 190 times greater than it had in the riband form, and 100 square feet of it weighs but an ounce.

PANAMA HATS.

What they are Made From, and How.

The *Jipijapa* is common in Panama and Darien, especially in half-shady places; but its geographical range is by no means confined to them. It is found all along the western shores of New Grenada and Ecuador; and it has been found even at Salango, where, however, it seems to reach its most southern limit, thus extending over twelve degrees of latitude from the tenth N. to the second S. The Jipijapa, or Panama hats, are principally manufactured in Veraguas and Western Panama; not all, however, known in commerce by that name are plaited in the Isthmus; by far the greater

proportion is made at Manta, Monti Christi, and other parts of Ecuador. The hats are worn almost in the whole American continent and the West Indies, and would probably be equally used in Europe, did not their high price, varying from two to one hundred and fifty dollars prevent their importation. They are distinguished from all others by consisting only of a single piece, and by their lightness and flexibility. They may be rolled up and put into the pocket without injury. In the rainy season they are apt to get black, but by washing them with soap and water, besmearing them with lime juice or any other acid, and exposing them to the sun, their whiteness is easily restored.

The process of making these hats is as follows: The "straw," previous to plaiting, has to go through several processes. The leaves are gathered before they unfold, all their ribs and coarser veins removed, and the rest, without being separated from the base of the leaf, is reduced to shreds. After having been put in the sun for a day, and tied into a knot, the straw is immersed in boiling water until it becomes white. It is then hung up in a shady place, and subsequently bleached for two or three days. The straw is now ready for use; and in this state sent to different places, especially to Peru, where the Indians manufacture from it those beautiful cigar cases, which have been sometimes sold in Europe for thirty dollars apiece. The plaiting of the hats is very troublesome. It commences at the crown, and finishes at the brim. They are made on a block, which is placed upon the knees, and requires to be constantly pressed with the breast. According to their quality, more or less time is occupied in their completion; the coarser ones may be finished in two or three days, the finest take as many months. The best times for plaiting are the morning hours and the rainy season, when the air is moist; in the middle of the day and in dry, clear weather, the straw is apt to break, which, when the hat is finished, is betrayed by knots, and much diminishes the value.

MANUFACTURE OF BUTTONS.

The first manufacturer of buttons in this country was Samuel Williston. While he was dragging along as a country storekeeper — his eyes having failed him while studying for the ministry — his wife bethought her that she could cover by hand the wooden buttons of the time, and thus earn an honest penny. From this the couple advanced in their ambition until they had perfected machinery for covering buttons, the first employed for the purpose in this country. From this sprang an immense factory, and then others, until Samuel Williston made half the buttons of the world. His factories are still running at Easthampton, coining wealth for the proprietors, and known to every dealer in buttons the world over. He is worth five or six millions, and has given $400,000 to Easthampton for a seminary and for churches, $200,000 to the South Hadley Female Seminary, and $200,000 to Amherst College, besides lesser gifts.

THE RICHEST MEN IN AMERICA.

The three richest men in America were Wm. B. Astor, A. T. Stewart and Com. Vanderbilt, all residents of New York city. Astor's wealth was mainly in real estate and its revenues; Van-

derbilt's was mainly in railway stocks and their dividends; Stewart's in goods, houses, stores, factories, lands, and stocks. William B. Astor was born in New York on the 19th of September, 1792. He died November 24th, 1875, aged 83. His wealth was estimated at $60,000,000. A. T. Stewart was born October 12th, 1803, in the County of Tyrone, near Belfast, Ireland. He died April 10th, 1876, aged 73, worth at least $50,000,000. Cornelius Vanderbilt was born on Staten Island in May, 1794. He died January 4th, 1877, aged 83. His wealth was estimated from sixty to seventy-five millions. Astor lived unostentatiously; Vanderbilt lived in a three-story brick house on a third-class street; and Stewart lived in a marble palace on Fifth Avenue, more magnificent than any other residence on the American continent, and equalled by few in any of the great cities in Europe. Astor and Vanderbilt were New Yorkers by birth; Stewart was a native of the north of Ireland. Astor was a large, heavy man, with very strong features, and a rubicund face like parchment, and gave the impression of being hard-up. Vanderbilt was a tall, slim, proud-looking man, straight as an arrow. Astor had heirs to his estate; Vanderbilt had children to whom he left his fortune; but Stewart was childless. Astor's public benefactions were confined to something like a couple of hundred thousand dollars, which he gave to the Astor Library, and the two golden candlesticks, nine feet high, which he had given to Trinity Church. Vanderbilt never made any public benefactions, excepting a steamship to the government during the war, till very recently, when he gave a million dollars for educational purposes — one-half of this sum to found a university in Tennessee, and the other half to another educational institution. Stewart always had the reputation of being close-fisted; but he should be credited with his million-dollar "Home for Women." Astor was an independent Methodist, and Stewart was said to be inclined to thinking for himself. Stewart was a scholarly man; Vanderbilt was not; Astor was an accomplished man of the the world.

THE INFLUENCE OF FOOD.

An excellent hint is given in the following item: Dr. Hall relates the case of a man who was cured of his biliousness by going without his supper and drinking freely of lemonade. Every morning, says the doctor, this patient arose with a wonderful sense of rest and refreshment, and feeling as though the blood had been literally washed, cleansed and cooled by the lemonade and fast. His theory is that food can be used as a remedy for many diseases successfully. As an example, he cures spitting of blood by the use of salt; epilepsy, by watermelons; kidney affections, by celery; poison, by olive or sweet oil; erysipelas, by pounded cranberries applied to the part affected; hydrophobia, by onions, etc. So the way to keep in good health is really to know what to eat — and what medicines to take.

The origin of the word dun is that, at the time of King Henry VIII of England, there was a bailiff by the name of Joe Dunn, who was very successful in collecting doubtful debts. When every other resort had failed with debtors, creditors would threaten to send Dunn after them; until the name became a by-word.

HISTORY OF LAMPS.

The invention of the lamp is ascribed to the Egyptians. Its use was known in the days of Moses and Job. The applications of lamps passed from Egypt into Greece, where they were consecrated to Minerva, the goddess of learning, as indicative of the scholar's nocturnal study. From Greece the use of lamps passed into Rome. Among the Egyptians, Hebrews, Greeks and Romans, oil-lamps were generally used, and they vied with each other in the construction of these instruments. Some of the specimens which have been preserved to the present time display much taste and elegance of design. The interiors of all of them are rough and meagre. The first person who is known to have published a collection of ancient lamps is Tortunio Liceto, an Italian, whose chief design appears to have been to prove the possibility of constructing lamps that would burn forever. The sixth hall of the museum of Portici is now entirely filled with lamps and candelabra discovered in the houses of Pompeii and Herculaneum. It would appear that the ancients constructed their earliest lamps of baked earth; but subsequently of various metals, bronze especially. There are a few ancient lamps of iron extant; but they are rare, either because that metal was little used for the purpose, or on account of its rapid decomposition in the ground. There are four specimens in the museum of Portici, and one specimen of a glass lamp which is entirely solid, and in one single piece. A golden lamp in the temple of Minerva, is mentioned by Pausanias; and St. Augustine speaks of lamps of silver. There was a strong belief among the ancient writers that perpetual lamps existed. Instances have been cited by various authors where lamps were found burning in ancient sepulchres, which were extinguished as soon as the air was admitted. The most remarkable instance is that of the tomb of Tulliola, daughter of Cicero, discovered at Rome in 1540. The notion in most of these cases probably arose from the inflammation of the hydrogen gas, which escaped from the tombs when opened. The lamps or candles used by the Jews in their own houses, were put into a high stand raised from the ground. The lamps used by the wise and foolish virgins, mentioned in the New Testament, were of a different kind. Critics and antiquarians seem to agree that they were a kind of torches, made of iron or potter's earth, wrapped about with linen, and moistened, from time to time, with oil. It was customary among the Romans to have a lamp either hanging from the ceiling, or placed on a stand in the room. The simplest way in which a lamp can be formed is that practiced in making night-lights, to burn in a sick chamber: a small quantity of water is poured into a glass tumbler, or other vessel, and above that a quantity of oil; a piece of cork is then pierced so as to admit a few threads of cotton to pass through it, and the cork being placed upon the oil will float, the cotton threads will draw up the oil by capillary attraction and a feeble but clear light will be given. The antique lamps, spoken of before, many of which possess great artistic beauty of form, cannot claim a higher construction than those of many rude nations. In general, they consist of a vessel, open or closed, with an unspun, round wick, which is held by a nozzle at the beak. As a combustion can only take place on the outside of the flame, more carbon is likely to be liberated from the oil

than the oxygen in contact with the flame can consume: hence, all lamps of this sort give a dim light, easily go out, and possess a smoky flame. The old kitchen-lamp had the beak removed to a considerable distance from the reservoir, so as to lessen the shadow cast by the flame, and increase the illuminating power. Amongst the northern nations of antiquity lamps were in use, but the difference in climate necessitated a different kind of lamp. The limpid oils of the present day were unknown to our Celtic and Saxon forefathers; besides, the cold winters would have solidified them, and they would not have been drawn up by the wick as arranged in the old Roman and Greek lamps. The solid fat of various animals was their chief illuminating material, except on the seacoast, where seal and whale oil occasionally helped them. Small, open stone pots, afterwards exchanged for metal, were used, and being partly filled with grease a wick was thrust down through the middle, and being lighted, consumed the fat as it was melted. However, all lamps continued to be dim, smoky, ill-made articles, soiling everything they came near, and filling the air with anything but an agreeable odor. Taste had been shown in the designs, but the principle remained the same. The most noted improvement was by a Swiss chemist named Argand, who was born at Geneva about the middle of the eighteenth century. It is known as the Argand lamp. The wick of this lamp is in the form of a cylinder, through which a current of air passes. He made the first model of the lamp in England, in 1782, and added a glass chimney to it. A person named Quinquest deprived him of the profit of the invention. Argand died in 1803.

MUSIC HEREDITARY.

Music hereditary shows itself more markedly, it would seem, in the arts than in the sciences. Taking music, we find some remarkable instances. The Bach family, which took its rise in 1550 and became extinct in 1800, presents an unbroken series of musicians for nearly two centuries of that interval. The head of the family was Veit Bach, a baker of Presburg, and his two sons, were the first of the family who were musicians by profession. The descendants literally "overran Thuringia, Saxony and Franconia," says Papilion, "they were all organists, church singers, or what is called in Germany 'city musicians.' When they became too numerous to live all together, and the members of this family were scattered abroad, they resolved to meet once a year, on a stated day, with a view to keep up a sort of patriarchal bond of union. This custom was kept up until nearly the middle of the eighteenth century, and oftentimes more than one hundred persons bearing the name of Bach — men, women and children — were to be seen assembled. In the family are reckoned twenty-nine eminent musicians, and twenty-eight of a lower grade." Rossini's family played music at fairs; Beethoven's father and grand-father were musicians; Mozart's father was Second Campellmeister to the Prince Bishop of Salzburg.

BABBITT METAL was invented by Isaac Babbitt, of Boston, and is used because it makes a good bearing without any fitting. Its composition, by weight, is: Tin 50 parts, antimony 5 parts, copper 1 part. There are numerous other recipes for Babbitt metal of different grades, but this forms a good composition for general use.

A CONDENSED HISTORY OF STEAM.

About B. C., 230, Hero of Alexandria invented three different but simple contrivances, showing the expansive power of steam, and in which rotary motion was produced by steam issuing from orifices, as water does in Barker's mill.

A. D., 450, Anthemius, an architect, arranged several caldrons of water, each covered with the wide bottom of a leather tube, which rose to a narrow top, with pipes extending to the rafters of the adjoining building. A fire was kindled beneath the caldrons, and the house was shaken by the efforts of the steam ascending the tubes. This is the first recorded notice of the power of steam.

In 1543, a Spanish captain, named Blasco de Garay, showed, in the harbor of Barcelona, a steamboat of about 200 tons, his own invention. It consisted of a caldron of boiling water under a movable wheel on each side of the ship; but after a while was laid aside as impracticable.

In 1562, the preacher, Mathesius, in his sermon to miners, prays for a man who "raises water by fire and air," showing the early application of steam-power in Germany.

In 1601, G. della Porta invented an apparatus for raising water, by placing a tube into a close vessel, in which a vacuum had been obtained by condensation of steam.

In 1615, Solomon de Caus, a French engineer, describes in one of his works, a steam engine, which was merely a contrivance for forcing the water contained in a copper ball through a tube by applying heat.

In 1629, G. Branca, an Italian engineer, invented a sort of steam windmill; the steam being generated in a boiler, was directed by a spout against the flat vanes of a wheel, which was then set in motion.

In 1647, Nye, an English mathematician, published a work, entitled "The Art of Gunnery," in which he proposes to "charge a piece of ordnance by putting water instead of powder, ramming down an air-tight plug of wood, and then the shot, and applying a fire to the breech till it burst out suddenly."

The first successful effort in England, was that of the Marquis of Worcester. In his "Century of Invention," 1655, he describes a steam apparatus by which he raised a column of water to the height of 40 feet. This with the exception of Biasco de Garay's, was the first really useful application of steam; the others had been mere toys.

In 1683, Sir Samuel Morland submitted to Louis XIV., a project for raising water by means of steam.

In 1698, Captain Savery obtained the first patent for the application of steam-power to various kinds of machines.

In 1703, Papin published his ideas, together with a drawing of an engine of his own construction, and to him is often attributed the origin of the idea of the cylinder and piston.

In 1705, Thomas Newcoman carried out the principle of the piston in his atmospheric engine, for which he obtained a patent. This was the first engine that was made practically and extensively useful, and forms the transition to the present steam-engine.

In 1765, James Watt made the first perfect steam-engine, and which, with certain improvements patented in 1769 and 1785, is essentially the same as the condensing engine now in use, and, in estimating some of the value of the benefits Watt conferred on the world,

Lord Jeffrey says: "It has increased indefinitely the mass of human comforts and enjoyments; and rendered cheap and accessible, all over the world, the materials of wealth and prosperity. It has armed the feeble hand of man, in short, with a power to which no limits can be assigned; completed the dominion of mind over the most refractory qualities of matter; and laid a sure foundation for all those miracles of mechanic power which are to aid and reward the labors of after generations. It is to the genius of one man, too, that all this is mainly owing! And certainly no man ever bestowed such a gift on his kind. The blessing is not only universal but unbounded; and the fabled inventors of the plow and the loom, who were deified by the erring gratitude of their rude cotemporaries, conferred less important benefits on mankind than the inventor of our present steam-engine. This will be the fame of Watt with future generations."

In the mean time, attempts had been making at steam navigation, in America, by Stevens, Livingston, and others. Robert Fulton, American, son of a Scotchman, and friend of Fitch and Rumsey, had *thought* of steam as a motive power for vessels as early as 1793, and had his first working model put in operation at Plombieres, in France, in 1803. Traveling through Scotland, he visited the unfortunate "Charlotte Dundas," and obtained drawings of her machinery. Returning to America with one of Bolton and Watt's engines, of eighteen horse power, he, in conjunction with Livingston, built a vessel called the "Clermont," at New York, in 1807, and made the first really successful voyage by steam, from New York to Albany.

The perfection of steam navigation belongs to *no one man*, or even generation; it is an honor in which a great number of men have, or ought to have, a share. Still, we must indisputably accord to Fulton the honor of having first proved the practical utility of steam navigation.

Five years later (1812), Henry Bell, of Glasgow, who had witnessed the experiments on the canal in 1789, and had accompanied Fulton on his visit to the "Charlotte Dundas," started a steamboat, the "Comet," on the Clyde, and was thus the father of steam navigation in Britain. The success of the "Comet" was the means of making the Clyde to Glasgow what the Nile is to Egypt — a source of wealth and prosperity almost unexampled.

As an incident of historical interest, the "Clermont" steamed up the Hudson on the 17th of August, 1807, with Fulton, a few friends, and six passengers, having left on the shore an incredulous and jeering crowd of people. Her dimensions were: Length, 130 feet; width, 18 feet; depth, 7 feet; burden, 160 tons. She was provided with an engine from Boulton & Watt's foundry, with cylinder 2 feet in diameter and 4 feet stroke; boiler 20 feet long by 7 feet deep, and 8 feet broad. The diameter of the paddle-wheels was 15 feet; boards 4 feet long and dipping 2 feet in the water.

The *American Citizen*, of August 17th, 1807, says:

"Mr. Fulton's ingenious steamboat, invented with a view to the navigation of the Mississippi, from New Orleans upward, sails to-day from the North River, near State's Prison, to Albany. The velocity of the steamboat is calculated at four miles an hour. It is said that it will make a progress of two against the current of the Mississippi, and, if so, it will certainly be a very valuable acquisition to the commerce of the Western States.

On the return of the "Clermont" to New York, Mr. Fulton addressed the following letter:

NEW YORK, August 21, 1807.

To the Editor of the American Citizen:

SIR:—I arrived this afternoon at four o'clock, in the steamboat from Albany. As the success of my experiment gives me great hope that such boats may be rendered of much importance to my country, to prevent erroneous opinions and to give satisfaction to the friends of these useful improvements, you will have the goodness to publish the following facts:

I left New York on Monday at 1 o'clock, and arrived in Clermont, the seat of Chancellor Livingston, at 1 o'clock on Tuesday: time, 24 hours; distance, 110 miles; on Wednesday, I departed from the Chancellor's at 8 o'clock in the morning, and arrived at Albany at 5 o'clock in the afternoon: distance, 40 miles; time, 8 hours! The sum of this is 150 miles in 32 hours, equal near 5 miles an hour.

On Thursday, at 9 o'clock in the morning, I left Albany, and arrived at the Chancellor's at 6 in the evening. I started from thence at 7, and arrived in New York on Friday, at 4 in the afternoon: time, 30 hours; space run through, 150 miles, equal to 5 miles an hour. Throughout the whole way, going and returning, the wind was ahead; no advantage could be drawn from my sails. The whole has, therefore, been performed by the power of the steam engine.

I am, sir, your most obedient,

ROBERT FULTON.

In 1786, the "Father of European Steam Navigation" had his mind strongly impressed with the idea of propelling boats with paddles driven by steam power; a few years later, having become acquainted with a gentleman who had a pleasure boat, he granted Bell permission to place a boiler, with machines for the paddles on board. In 1800, Bell showed the British government "the practicability and great utility of applying steam to the propelling of vessels against winds and tides, and every obstruction on rivers and seas, where there was depth of water," but the Lords of the Admiralty were of opinion that the plan proposed would be of no value in promoting trans-marine navigation! In 1803, a second application resulted in no better support. Bell then wrote to the American government on the great importance of steam navigation and its admirable adaptation to those noble rivers, and they appointed Fulton to correspond with him. In 1804, Fulton was employed by his government to proceed to England and take drawings of cotton and other machinery. Bell gave him plans, drawings and models of his intended steamboats, advised him to take on his return one of Boulton & Watt's engines, which suggestion he acted on, and in 1807 that same engine illustrated the folly of our grandfathers' proverb, "No man can sail against wind and tide."

The success of Fulton put fresh life into Bell, and he employed an eminent ship-builder to build for him a boat of 25 tons burden, and having himself built an engine of 3 horse power to which he applied the paddles. After several experiments, this "fire-driven barque" was placed on the station between Glasgow, Greenoch and Helensburgh, making five miles an hour.

The following copy of an advertisement appeared in the Glasgow papers:

"THE STEAMBOAT COMET,"

Between Glasgow, Greenoch and Helensburg.

For Passengers only.

The subscriber having, at much expense, fitted up a handsome vessel to ply upon the river Clyde, from Glasgow, to sail by the power of air, wind

and steam, he intends that the vessel shall leave Broomielaw on Tuesdays, Thursdays and Saturdays, about midday, or such hour thereafter as may answer from the state of the tide; and to leave Greenoch on Mondays, Wednesdays and Fridays, in the morning, to suit the tide.

The elegance, safety, comfort and speed of this vessel require only to be seen to meet the approbation of the public; and the proprietor is determined to do everything in his power to merit general support.

The terms are for the present fixed at 4s. for the best cabin, and 3s. for the second; but beyond these rates nothing is to be allowed to servants, or any person employed about the vessel.

Passengers by the "Comet" will receive information of the hours of sailing by applying at Mr. Houston's office, Broomielaw, or Mr. Thomas Blackney's, East Quay Head, Greenoch. HENRY BELL.

HELENSBURGH BATHS, August 5, 1812.

The expressiveness of "elegance, safety, comfort and speed," as appiled by Henry Bell to his little "Comet," has not been improved upon, but has remained the favorite wording in all *Star Line* advertising. Little did Bell imagine when developing this new and mighty power, that he was giving to the fickleness of winds and the faithlessness of waves the certainty and steadiness of a highway upon the land, and to all nations keys to unlock every other kingdom on earth, to take our produce to every nation, and to bring in return the products of all climes.

As a contrast, and to illustrate the progress made during the past seventy years in building river steamboats, we refer to the "Drew," built at New York in 1866, to ply between New York and Albany, alternately with her consort, the "St. John," and which is one of the most beautiful in appointments and decorations of any boat on the North River.

The floating palace is a trifle smaller than the "St. John," and cost, delivered at the dock ready for service, a little over $800,000; is 366 feet 5 inches in length, 77 feet 5 inches in breadth, 10 feet 9 inches depth of hold, draught when loaded 5 feet 6 inches, and registers 2,902 tons; has 350 state rooms, and can accommodate 1,000 sleeping passengers.

APPLICATION OF STEAM TO NAVIGATION.

When once steam was known as a motive power, its application to navigation was obvious enough; it was even to this purpose that the first recorded attempt was made to apply it at all — that of Blasco de Garay, in the harbor of Barcelona, in 1543. The only surprising question is, that thirty years should have elapsed — between 1777, when the steam engine had become, in Watt's hands, an efficient power for other purposes, and 1807, the date of Fulton's first voyage — before a really *serviceable* steam vessel was produced. Boats using revolving paddles instead of oars, and propelled by oxen, horses or men, were known to the Romans, and used for ferryboats in modern times, and the great problem on which *savants* and illustrious mechanics had been expending their inventive genius was the application of machinery for propulsion, and a power greater than animal or manual to drive that machinery. Watt showed how that egg could stand on the table. The world had now got the rotating engine, the crank connection with a shaft, the revolving wheel,

the rotating paddles; but who was to turn all to practical uses?

In 1736, Jonathan Hulls obtained in England a patent for a tow-boat, to be used by a paddle wheel, set in motion by a sort of steam engine. The project appears never to have been executed.

In 1756, Gautier, a French mathematician, issued a treatise on "Navigation by Fire," which attracted the attention of the Venetian Republic, and procured for him an invitation to the shores of the Adriatic; he went, but death soon put an end to his labors. His theory, however, was practically exemplified in 1782, when the Marquis de Jouffrey constructed a steamboat of considerable size, which navigated the Soane for some time; it was deficient, however, in power.

From 1774 to 1790, the Count d'Auxinon, the Brothers Periere, and others, in France, severally constructed and tried boats to be propelled by steam, none of which were successful.

In 1783 to 1789, Fitch and Rumsey were experimenting in America, on constructing boats *to work against streams;* their first working models were propelled by *manual* labor, with setting poles attached to machinery, and for which Rumsey petitioned the Legislature of Pennsylvania, in 1784, for the exclusive right to this setting-pole boat. In 1785, both of these gentlemen had their attention directed to the use of steam as a motive power, and, in that year, Rumsey received from the legislatures of Virginia and Maryland the exclusive right to run steamboats on the waters of those States, while, next year, the States of Pennsylvania and New York granted the same exclusive right to Fitch. To reap the benefit of these exclusive rights, Rumsey began building his *steamboat* in May, 1785, tried her in December, and a defect in the machinery was discovered. In the Spring of 1786, he made a successful experiment at Shepherdstown, with a boat of nine tons, working against the current of the Potomac at the rate of four or five miles an hour. Fitch, in 1786, constructed his working model, and in 1787 built a boat of sixty tons, called the "Perseverance," making the trip from Philadelphia to Burlington, and averaging six miles an hour. In 1790, he placed another and larger boat on the Delaware, which ran throughout the season, making regular trips at an average of seven and a half miles an hour.

Six years afterward, Fitch moved a small boat on the Collect Pond, New York City, by a small engine and a worm-screw projecting from the stern of the boat; but neither of these experiments led to the general introduction of steam propulsion.

In 1788, the next important experiment was that of Miller and Taylor, in Scotland, on board a double boat, with a paddle-wheel in the inter-space, was a perfect success, and led to the most decided step in the discovery of steam navigation previous to the final success of Fulton. Next year, Miller had large engines fitted into a vessel, and tried on the Forth and Clyde Canal, when the vessel moved at seven miles an hour.

In 1801, Symington took out a patent for the construction of steamboats, and, in 1803, built the "Charlotte Dundas," to tow vessels on the Forth and Clyde Canal. The success was complete, but the agitation of the water by the paddles was found to wash down the banks in an alarming manner. The use of the vessel was therefore abandoned.

HISTORY OF THE FIRST OCEAN STEAMER.

It is but little over half a century since the first steam-ship crossed the ocean, and to certain of the citizens of Savannah, Georgia, the world is indebted for her construction. She was built in New York, and finished in February, 1819, was 300 tons burden, clipper built, full rigged, and propelled by one inclined, direct-acting, low-pressure engine, similar to those now in use. The size of her cylinder was 40 inch in diameter, with 6 ft. stroke, and carried 20 lbs. steam. The paddles were of wrought-iron, with only one flange, and entirely uncovered. They were so attached to the shaft that their removal and shipment on deck could be accomplished in from 15 to 20 minutes, without occasioning the slightest inconvenience. She had two superb and elegant cabins for passengers — ladies' and gentlemen's — the two being separated, and both handsomely furnished. All her berths, 32 in number, were state-rooms, and provided with every comfort. Her speed without sails is set down at 5 knots though vessels that passed her under steam and sail, in her voyage across the Atlantic, reported her movements at from 9 to 10 knots.

The "Savannah" left New York for Savannah on the 28th of March, 1819, and arrived in that port on the 6th of April. Her arrival we find thus chronicled in the *Republican* of the 7th of April, 1819:

"The steamship 'Savannah' arrived at our port last evening after a boisterous passage of seven days from New York. On her approach to the city, hundreds of citizens flocked to the banks of the river, and while she ascended, saluted her with long and loud huzzas! The utmost confidence is placed in her security. It redounds much to the honor of Savannah when it is said that it was owing to the enterprise of some of her spirited citizens that the first attempt was made to cross the Atlantic ocean in a vessel propelled by steam. We sincerely hope the owners may reap a rich reward for their splendid and laudable undertaking."

The "Savannah" left that port for an excursion trip to Charleston on the 14th of April and returned on the 30th of the same month. The *Republican*, of the 4th of May, has the following announcement:

"PASSAGE TO NEW YORK.

The steamship 'Savannah,' Captain Rogers, will make one trip to New York, previous to her departure for Liverpool, should a sufficient number of passengers offer, and will be ready to proceed in the course of this week or commencement of the next. Apply on board at Taylor's Wharf, or to

SCARBROUGH & MCKINNE."

But few or no passengers offering, she, on the 11th of May, took an excursion party down to Tybee and the forts, returning to the city late in the afternoon. In the *Republican* of May 19th we find the following advertisement:

"FOR LIVERPOOL.

"The steamship 'Savannah,' Captain Rogers, will, without fail, proceed for Liverpool direct, to-morrow, 20th inst. Passengers, if any offer, can be well accommodated. Apply on board."

No passengers, however, offered; and according to promise, the steamer weighed anchor on the 20th of May, and set out on her voyage for Liverpool direct, an experiment hitherto untried in the history of the world. On June 20th, after a voyage of 31 days, the "Savannah" came to anchor in the port of Liverpool. During her passage she worked her engine 18 days — it being found necessary, on so long a voyage, to economize fuel. She used

pitch-pine; the use of coal in American steamers not having been introduced at that day. On nearing Liverpool, the more effectually to astonish the Britishers, the wheels were restored to the shaft, all sails set, and she went into the Mersey amid the wildest astonishment of all beholders.

Remaining at Liverpool a month, she sailed for St. Petersburg, her original destination, where Captain Rogers and his strange craft were received with every demonstration of respect and admiration. She remained at St. Petersburg for several weeks; then, turning her course westward, the bold little ship arrived in Savannah as she left it—in ballast—November 30th, after a voyage of 50 days from St. Petersburg, all well; and, to use Captain Roger's own language, "neither a screw, bolt, nor rope-yarn parted," although she experienced very rough weather.

In the month of December, the steamer visited Washington City, where she astonished the "collective wisdom," and thence went to New York.

Soon after her return to New York, the "Savannah" was divested of her steam apparatus, converted into a packet-ship of the same name, and ran for some years between Savannah and New York.

Her final fate was a sad one. In one of her trips from Savannah to New York, she was driven ashore, in a storm, on Long Island, and went to pieces.

The Canadians claim for their country the credit and honor of the first ocean-transit by steam, alleging that the "Savannah" could hardly be called a steamship, because her paddle wheels could be removed and present no impediment to her sailing powers; that after steaming a few days her paddle-wheels were unshipped, and taken on deck, the remainder of the distance having been performed under canvas; and that it neither demonstrated the utility, nor solved the problem of ocean steam-navigation, but, on the contrary, if any thing was proved, it was the non-adaptation of steam for oceanic traversing, as, on the return of the "Savannah," she was converted into a sailing ship, and the further prosecution of placing a locomotive pathway on the ocean abandoned, until 12 years later, in 1831, the steamship "Royal William" was built at Three Rivers, in the Province of Quebec, was 160 feet long, 44 feet broad, and 17 feet 9 inches depth of hold, and registered 363 tons—sailed from Quebec August 5, 1833, for London, put into Pictou, and arrived at Gravesend about the 16th of September, in 25 days from latter port. She was afterward sold to and employed by the Spanish or Portugese government as a ship-of-war.

CONDENSED HISTORY OF ATLANTIC STEAM NAVIGATION.

It was as late as 1836 that the crossing of the Atlantic Ocean, by steam-power alone, began to be seriously discussed. Those who looked at the subject from the scientific point of view, and discussed it philosophically, very generally gave a verdict against it; and even practical men, who had been engaged in the navigation of the Mediterranean, and other short voyages, were almost unanimous in asserting that it could not be done, or, at least, that it could not be made commercially advantageous. The nicest calculations, based on established principles and facts, were made to demonstrate the impracticability of the proposition.

The following is a specimen of the

reasoning, founded upon the use of steam in the government of Great Britian: "To accomplish a voyage of the same length as that across the Atlantic, two tons of coal will be used for each horse-power of the engines; that is to say, if the engines are of 300 horse-power, they will consume 600 tons of fuel before they reach the terminus of a 3,000 mile voyage. But a spare supply must also be carried, to provide against accident and delay; so that the quantity must be raised to 700 tons. On the other hand, if the tonnage of the vessel be more than four times its horse-power, the latter will be inadequate to its propulsion at the ordinary rate of steamship. The tonnage of the vessel, therefore, could not exceed 1,200, and, after making allowance for cabins, machinery, boilers, ship's stores, etc., the space left for fuel would not contain more than 500 tons, which would be all consumed before the vessel arrived within five hundred miles of the Atlantic coast."

Probably nothing did more to settle the question of the impracticability of ocean steam-navigation, in the minds of scientific men, than the essay of a celebrated natural philosopher, who had made the steam-engine one of his studies for life, who proved to a demonstration, that, in order to succesfully cross the Atlantic, a steamer must either have a tender, with a fresh supply of coal, or a depot somewhere in mid-ocean. But his essay did not convince practical men, and it had scarcely been received and read in this country, before it was followed by the pioneers in the mighty fleet of steamers which have ever since been crowding the great thoroughfare of the nations. While the philosophers were proving to their own satisfaction that the Atlantic could not be crossed by steam, some practical men were engaged in constructing, at Bristol, a steamship, — which for that day, was considered quite gigantic, and, on that account, was to be called the "Great Western" — which should set at rest the discussion by proving whether the thing could be done or not. She was finished in the spring of 1838, and was announced to sail for New York on the 8th of April. She had a deck 230 feet long; she was nearly 60 feet wide; her paddle-wheels were 28 feet in diameter, and her paddles 10 feet long. The horse-power of her engines was 450; the weight of her boilers and machinery was 300 tons, and her carrying tonnage 1,340. This was regarded, at that time, as an immense vessel, although small compared with numbers of steamships constructed since, and her very size awakened apprehensions in regard to her safety. She was fitted up with elegance, and every temptation to passsengers to make the voyage in her was presented, but with little effect. Only seven were booked for the trial-trip.

In the mean time, a plucky little rival had been preparing for a contest with the "Great Western" for the honor of first crossing the ocean. The "Sirius," a small steamship, built to ply between London and Cork, actually got the start, and, leaving the latter port, was three days at sea before the "Great Western" sailed. The "Sirius" left Cork on the 5th of April, 1838, and the "Great Western" left Bristol on the 8th. Both ships were bound for New York, and it is not a little remarkable that the first experiment of crossing the Atlantic, in this manner, should be in reality a trial of speed between two steamers. Nor has there been a much more hotly-contested, or a more exciting race, on the

ocean since that time. The "Sirius" steamed out of port in the very teeth of a strong westly wind, and a hard time she had of it during the first few days of the voyage. The elements seemed to have conspired to oppose her progress. First it blew a strong gale from the west that raised a heavy sea; then the wind chopped round, until it had completely boxed the compass, and tried all its power in fresh gales; and then it blew as strong as ever from the west, as if to make a last effort to stop the course of the gallant little ship. But all was of no avail. The "Sirius" held on her way right valiantly, and, getting lightened of her coal, she gained speed, until she reached 218 miles a day, and, on the morning of the 23d of April, she reached New York. The "Great Western" was on a stern-chase, which is always a long chase, but, from the first day out until the end of her voyage, she performed nobly. She made 10 miles an hour the second day, and her daily average speed, during the entire voyage, was 211 miles. She thus gained rapidly upon her competitor, but the three days' start decided the question, and the "Great Western" entered the harbor on the afternoon of the same day as the "Sirius," being thus only a few hours behind. The time occupied by these two vessels, in their voyages out, was $18\frac{1}{2}$ and $14\frac{1}{2}$ days respectively. Although the duration of their passages was widely different, both vessels consumed, as nearly as possible, the same quantity of fuel, namely, 453 tons. The "Sirius" had exactly this quantity of coal on board when she left Cork, and would have entered New York harbor without a particle of this precious commodity remaining, had she not used, toward the end of her journey, as an equivalent for 23 tons of coal, 43 barrels of rosin. The first fruitful steam-voyage across the Atlantic was made by the "Sirius." Like its namesake in the heavens, the "Sirius," was, upon the waters, a star of the first magnitude; and, at this distance of time, we can say that its appearance did not herald the malign influences popularly ascribed to the great dog-star, but that this "Sirius" upon the Atlantic resembled the summer rising Sirius upon the Nile, the harbinger of overflowing prosperity on either shore.

Very many will remember the excitement which prevailed in New York when the time drew nigh for the arrival of the "Great Western," as the date of her sailing had been advertised. There was much incredulity in regard to the success of the experiments; and few, perhaps, had any strong confidence that she would ever turn up on this side of the water. But every day crowds were on the Battery, looking out for the first signs of her appearance, and when, on the morning of the 23d of April, a smoke was descried in the distance, the anxiety to know whether it was the steamer was quickened, and when one actually appeared, and began to loom up as no ordinary craft had done in our waters before, the excitement became intense. The report soon spread through the city, the crowd increased, and when the "Sirius" sailed up and quietly dropped her anchor in the North River, cheer upon cheer rent the air. The same excitement was renewed in the afternoon upon the arrival of the "Great Western." Streaming with flags, and crowded with people who had gone on board, the "Sirius" lay waiting the arrival of her competitor; and, as the "Great Western" steamed in, three hearty cheers were given by all on board, and a salute of twenty-six guns

was fired from the Battery. As the vessel drew up to the dock, says the journal of one of the seven passengers, "boats crowded around us in countless confusion, flags were flying, guns firing, and bells ringing. The vast multitude sent up a shout, a long, enthusiastic cheer, echoed from point to point, and from boat to boat, till it seemed as though they never would have done." This was only fifty-one years ago, and now steamships are crossing the ocean in such numbers that it has become like a grand ferry, in which steamers are almost jostling one another, and a broken voyage is a rare occurrence. The result of this experiment in ocean navigation has taught us this important lesson, that no enterprise must be pronounced impracticable until it has been actually and effectually tried.

The year 1838 was, therefore, a memorable one in the history of steam navigation, and at that time no mind could have conceived, no man would have dared to utter, the prediction that in the year 1889 thousands of steamers would leave European for American shores and a like number leave America for Europe. Yet such is the fact. Not only on the Atlantic, but on every sea and ocean, the steamer is rapidly displacing the sailing vessel. The splendid frigate ship, the pride of the old East India Company, and the beautiful American-China clipper, whose performances were the talk the world over, have nearly all disappeared before the encroaching steamer. The improvements in steaming have fully kept up with its expansion. Efficiency in construction has been so much improved, and the consumption of fuel so greatly lessened by new inventions connected with steam engines, that the longest routes can be traversed without stopping for coals, while passengers can be insured fresh provisions for the whole voyage. The substitution of the screw for the paddle-wheel, and the superseding of wood by iron in the construction of the hulls, have materially aided to accomplish this result. But, as "we are bound to maintain that the art of invention is capable of growing as inventions do," more will yet be accomplished. The substitution of gaseous, subtile, or liquid fuel for coal, and the combination of more economical engines, with a lighter material for hulls, such as steel, will, in a short time, entirely re-revolutionize the ocean carrying trade of the world.

RAILROADS.

Condensed History of Locomotion.

Railroads were not built, as is generally supposed, as pathways for locomotives; the latter are of modern invention, while railroads, or tramways, as they were at first called, have been used for centuries in transporting mineral products from mines to places of shipment. The first railways were merely wooden wheelways laid in the ordinary roads to lessen the friction, and render the work easier for the horse; prior to which, hard, smooth-surfaced, and solid track-ways, constructed of blocks of stone closely fitting together, were used for facilitating the transport of heavy loaded wheeled vehicles. Timber rails were used for one hundred and fifty years, when in 1767 the experiment was tried of covering the wooden rails of a tramroad with a plating of iron. The experiment was successful, and a few years afterward rails wholly of cast iron began to be constructed. In 1793

wooden sleepers were superseded by stone ones. Until 1801, the rails were all of the kind called *flat rail,* or tram-plate with a flange or turn-up on the inside. About that year *edge-rails* began to be used, the flange then being on the wheel.

About the year 1800 a thoughtful Scotchman stood looking at a small train of coal-wagons impelled by steam along a tramroad which connected the mouth of one of the collieries in the north of England with the wharf at which the coals were shipped. "Why," he asked of a bystander, "are not these tramroads laid down all over Britain, so as to supersede our common roads, and steam-engines employed to convey goods and passengers along with them, so as to supersede horse-power?"

The bystander replied: "Just you propose that to the nation, sir, and see what you will get by it! Why, sir, you will be worried to death for your pains."

Nothing more was said, but the intelligent traveler could think of nothing by day, nor dream of anything by night, but tramroads, locomotive steam-engines, horse-power superseded! The idea he had conceived continued to infest his brain, and would not be driven out. Tramroads, locomotive steam-engines, horse-power superseded! —he would talk of nothing else with his friends. At length he broached the scheme openly; hardly anybody would listen to him; still he persevered, dinning into the public ears the same wearisome words, receiving little encouragement from statesmen and politicians, and none from theoretical philosophers. But at length a few commercial men began to be interested in his plan, and the consequence was, that railways have been constructed and are in progress in all parts of the civilized world. Philosophers speculate on the astonishing effects which such a means of rapid locomotion must have on the character and prospects of the whole human race; by means of railways distant countries become familiar to all, and the only question is, where will this railway impulse end? Into what strange condition of humanity is it leading us? And the beginning of all this was the dream of a thoughtful man, looking, about some seventy years ago, at some coal-wagons running along a tramroad to a wharf. He explained his scheme to the public in the work entitled "Observations on a General Iron Railway, or Land Steam Conveyance, to supersede the necessity of horses in all public vehicles; showing its vast superiority in every respect over all the present pitiful methods of conveyance by turnpike roads, canals, and coasting traders, containing every species of information relative to railroads and locomotive engines."

The first record we have of rails being used on road ways was in 1630, but it was not until the year 1800 that the idea of employing them for general purposes of traffic was suggested. For twenty years thereafter horse-power alone was used. On the 18th of November, 1822, the first locomotive, and on the 29th of September, the first passenger coach that ever run on a railroad, started on its experimental trip (with the directors and their friends,) on the opening of the Stockton & Darlington Coalroad Railway. Mr. W. H. Brown, in his history of the first locomotive in America, says; "This vehicle was named the 'Experiment,' and was a very modest and uncouth-looking affair, made more for strength than beauty; a row of seats ran along each side of the interior, and a long table was fixed in the center, the access be-

ing by a door-way in the rear end, like an omnibus of the present day, and was the only carriage upon the road for some time. It was, however, the forerunner of a mighty traffic, and soon after, newer and more improved passenger carriages were introduced upon the road, all at first drawn by horses.

"The first railway coach, the 'Experiment,' was regularly put on the road for passenger use on the 10th of October, 1825. It was drawn by one horse, and performed a journey each way daily between the two towns—twelve miles—in two hours. This novel way of traveling soon became popular, and eventually proved so lucrative and extensive that the carriage could not contain the applicants for a ride. Inside and outside it was crowded and every available spot was occupied. The 'Experiment,' however, was not worked by the railway company as passenger cars are now, but was let to other parties, they paying a certain toll for the use of the road. It soon became a lucrative business; hotel keepers and others embarked in the enterprise, and a strong opposition was raised up between the rival owners or companies."

At the completion of the Liverpool and Manchester Railroad, in 1829, the directors had not determined whether to use horse or steam power, and if the latter, whether stationary or locomotive engines. The road was only forty miles in length, yet it had cost four million dollars! Although horse power had many advocates, steam carried the day; and to determine whether to use stationary or locomotive engines, a prize of £500 was offered for an engine to be ready by a certain time, and be able to fulfill certain conditions; one of which was, that the engine must draw twenty tons weight at a speed of ten miles an hour, it not being considered safe to travel at a greater speed. So absurd was the project and its conditions considered, that an eminent Liverpool gentleman remarked that "only a parcel of charlatans would have issued such a set of conditions; that it had been proved to be impossible to make a locomotive engine to go ten miles an hour, but, if it was ever done, he would undertake to eat a stewed engine wheel for his breakfast." George Stephenson constructed his far-famed "Rocket" engine, entered on the contest, won the prize, and determined the question of the use of locomotive power, not only on the Liverpool and Manchester road, but on all future railroads, achieving results predicted by Dr. Anderson, of Edinburgh, when advocating, in 1800, a proposition to build railroads for the transportation of freight and passengers, he said: "If we can diminish only one single farthing in the cost of transportation and personal inter-communication, and you at once widen the circle of intercourse; you form, as it were, a new creation—not only of stone and earth, of trees and plants, but of men also; and, what is of far greater consequence, you promote industry, happiness and joy. The cost of all human consumption would be reduced, the facilities of agriculture promoted; time and distance would be almost annihilated; the country would be brought nearer to the town; the number of horses to carry on traffic would be diminished; mines and manufactories would appear in neighborhoods hitherto considered almost isolated by distance; villages, towns, and even cities, would spring up all through the country; and spots now silent as the grave

would be enlivened with the busy hum of human voices, the sound of the hammer, and the clatter of machinery; the whole country would be, as it were, revolutionized with life and activity, and general prosperity would be the result of this mighty auxiliary to trade and commerce throughout the land."

The first railroad built in the United States was in 1827, from the Quincy quarries (Massachusetts) to the river, and extended three miles. The next was from the coal mines at Mauch Chunk to the Lehigh River, which was nine miles in length, and was built in 1827–28.

Next year the Delaware and Hudson Canal Company constructed a road from their coal mines at Honesdale to their canal.

On the 4th of July, 1828, Charles Carroll, of Carrollton, the only survivor of the signers of the Declaration of Independence, and then over ninety years of age, commeneed the construction of the Baltimore & Ohio Railroad, by laying, amid appropriate and imposing ceremonies, a corner stone, at which he is reported to have said: "I consider this among the most important acts of my life, second only to my signing the Declaration of Independence, if even second to that." This road was the first established in the United States for commercial purposes and the transportation of passengers and freight; it was finished in I852, and at that time was the longest railroad in the world.

In the same year (1828) was organized and commenced the South Carolina or Charleston and Hamburg Railroad, the first in the world *built expressly for locomotive power, and for general freight and passenger business*, and on which, two years afterward, ran the first and second locomotives that ever were built in America for actual service on a railroad. This road had also the honor of having laid the first hundred consecutive miles of iron rails ever laid on any road.

The first excursion trip with a train of passenger coaches, in the State of New York, was on the Mohawk and Hudson Railroad, from Albany to Schenectady, on August 9, 1831. Before the train started, a sketch of the locomotive, tender and the first two of the number of cars in the train, and correct likenesses of the engineer and passengers represented in the cars, was made by William H. Brown, one of the excursionists, cut out of black paper with a pair of scissors. The original picture which was presented by the artist to the Connecticut Historical Society, was about six feet in length, and is yet preserved by the Society and highly prized for its antiquity and truthfulness.

It is only fifty years since the first ocean steamer found its way across the Atlantic. At that time only 1,431 miles of railway had been constructed. There are at this time 155,000 miles in operation, with engines double in speed and quadrupled in power, working night and day transporting the vast products of the globe. In the way of comparison between the old-fashioned stage-coach body pattern of fifty years ago, and the splendid drawing-room, sleeping and dining-room, saloon palace cars, and the late improved vestibule cars of to-day, can it be possible to travel with any more luxury, ease and comfort than when drawn by the fastest locomotives in the world, and with the facilities for carrying our mail in a fraction of the time taken heretofore? Will this be eclipsed in the next fifty years?

HOW BIRDS LEARN TO SING AND BUILD.

What is instinct? It is the "faculty of performing complex acts absolutely without instruction or previously acquired knowledge." Instinct, then, would enable animals to perform spontaneously acts which, in the case of man, pre-suppose ratiocination, a logical train of thought; but when we test the observed facts which are usually put forward to prove the power of instinct, it is found that they are seldom conclusive. It was on such grounds that the song of birds was taken to be innate; albeit a very ready experiment would have shown that it comes from the education they receive. During the last century, Barrington brought up some linnets, taken from the nest in company with larks of sundry varieties, and found that every one of the linnets adopted completely the song of the master set over them, so that now those linnets — larks by naturalization — form a company apart when placed among birds of their own species. Even the nightingale, whose native sound is so sweet, exhibits, under domestication, a considerable readiness to imitate other singing birds. The song of the bird is, therefore, determined by its education, and the same must be true of nest building. A bird brought up in a cage does not construct the nest peculiar to its species. In vain will you supply all the necessary materials; the birds will employ them without skill, and will oftentimes even renounce all purpose of building anything like a nest. Does not this well known fact prove that, instead of being guided by instinct, the bird learns how to construct the nest, just as a man learns to build a house?

HISTORY OF STOCKINGS.

These, as now made, are comparatively a modern invention. The art of knitting them by hand, with long wire needles, is supposed by some to have come originally from Spain, although it is not ascertained that it was invented in that country. A company of stocking knitters was established in Paris in 1527.

Previous to the time of Henry VII., knitted silk stockings were unknown in England; and Stowe observes, in his Chronicle, "for you shall understand that King Henry VIII. did wear only cloath hose, or hose cut out of ell broad taffeta; or that by great chance there came a pair of Spanish silk stockings from Spaine." Thus, although silk stockings had been brought into England prior to the reign of Edward VI., yet we find Stowe commemorating as "a great present" a "long payre of Spanish silk stockings" that Sir Thomas Gresham presented to that king. Thus, they were articles of great rarity and value in the time of Queen Elizabeth, for we are informed by Stowe, "in 1560, her silk woman, Mistris Mountague, presented her majestie with a payre of black knit silk stockings for a new year's gift; the which, after a few days' wearing, pleased her highness so well that she sent for Mistris Mountague and asked her where she had them, and if she could help her to any more; who answered, saying, 'I have them very carefully on purpose, only for your majestie; and seeing those please you so well, I will presently set more in hand.' 'Do so,' quoth the queen, 'for indeed I like silk stockings so well, because they are so pleasant, fine and delicate, that henceforth I will wear no more cloth stockings.'"

Stockings continued long to be knit by hand in the various countries in Europe, and the machine at present used to weave them, called the stocking loom, was invented in 1589, by Mr. William Lee, a native of Woodborough, near Nottingham. This machine, to any one who attentively considers its complex operation, and the elegant sleight with which it forms its successive rows of loops or stitches, will appear to be one of the most remarkable strides ever made in mechanical invention. Notwithstanding, Lee met with no encouragement in England; Queen Elizabeth, the patroness of art, was then in her decline; and her successor, James, did not perceive the value or importance of manufacture.

The encouragement refused by King James was offered by Henry IV., of France, and his sagacious minister, Sully. Under their patronage, Lee settled at Rouen, where he established his manufacture; but being envied by the inhabitants of that place, whose genius he had eclipsed, he was proscribed as a Protestant; and, concealed in Paris, he ended his days in secret grief and disappointment. Some of his workmen made their escape to England, and restored the invention to its native country. It was in Leicestershire, and the neighboring counties of Nottingham and Derby, that the first manufactories were established, and laid the foundation of the hosiery trade of that district.

The invention of the stocking frame by Lee enabled the English manufacturers to export vast quantities of silk hose to Italy, where they retained their superiority for a long time; for Keysler, in his travels through Europe, so late as 1730, remarks that "at Naples, when a tradesman would highly recommend his stockings, he protests they are right English."

In 1758, Jedadiah Strutt, of Becher, near Derby, invented a machine for making ribbed stockings; and the spinning machine of Arkwright was successfully applied to the manufacture of cotton stockings.

WOOD BOOKS.

In the museum at Cassel, Germany, is a library made from five hundred European trees. The back of each volume is formed of the bark of a tree, the sides of the perfect wood, the top of young wood, and the bottom of old. When opened, the book is found to be a box, containing the flower, seed, fruit and leaves of the tree, either dried or imitated in wax. At the Melbourne Colonial Exhibition of 1866, Colonel Clamp exhibited specimens of Victorian wood converted into small boxes of book form, according to a design suggested by that gentleman at the Victorian Exhibition of 1851, and then suggested by Baron Ferd. Mueller. Nothing could be more convenient and more interesting than a library (to speak allegorically) of such imitation books, representing the different timbers of various countries, which could be systematically, or alphabetically, or geographically arranged. Australia alone could furnish of such a collection more than a thousand volumes. At the Paris exhibition of 1867, Russia showed a similar collection of wooden works, cleverly designed, showing the bark as the back binding, and lettered with the popular and scientific names of the wood. Each book contained samples of the leaves and fruit of the tree, and a section and shaving, or veneeer of the wood.

BANK NOTES.—HOW THEY ARE ENGRAVED.

The fancy net-work of lines and circles composing the ornate patterns of border, ends and dies on the bank plate, are all engraved by the "*Geometric Lathe*," (the discovery of which is the wonder of the Nineteenth Century,) which is composed of thousands of fine cast steel cog wheels. Every line or circle engraved, will be fine, sharp and clear, of one even size and as true as if struck by a compass. The artist operating the *Lathe* is obliged to change the wheels for engraving dies of thousands of various patterns.

The ornamental engraving is executed on plates of softened polished steel. The steel plate is placed upon a revolving carriage in the *Lathe* a sharp-pointed steel graver attached to the machinery, extends to the plate, governed by cams, eccentrics and moving centers.

The artist places his foot upon the treadle, which sets the machine in motion. The graver sinks into the revolving plate, geometric, eccentric and concentric circles—all interwoven in beautifnl net-work so exactly true in every particular that no human hand can ever compete. The gravers are all of the same size, and move with a firm, steady stroke, graving every line and circle of the same depth and width, and in every genuine bank note, the net-work of white lines will be of an exact size.

When an engraving is finished, it is inspected by an artist officer, whose duty it is to inspect all bank note engraving, and should he allow one imperfect object to be transferred to a bank plate, he would be discharged for incompetency.

If the engraving is perfect it is hardened hard as razor steel, then placed into the transfer press, and by passing under a roller with thirty tons weight upon it, the design is transferred to another plate. That plate is hardened and placed upon the press and transfers its design to a soft steel cylinder, which is hardened and ready to convey its device to the bank plate.

Counterfeit notes are printed from raw hand engravings; the entire die being, often, a mixture of dots like salt and pepper. The lines, if any, are coarse and broken, mixed together, dull, blurred and clogged in the angles of the net-work, like a fish-net. It shows the hand work in trying to imitate this *Lathe* work.

On all genuine notes, the shading of the letters looks fine, sharp and clear. This is engraved by the ruling engine with the same sized line found in the net-work of a die. The lines are even, and spaced an exact distance apart, entirely straight, leaving a clear, sharp, white streak between each line.

Counterfeit shading is dim and faint, being engraved by hand, and each line is dulled and blurred because it partakes of the trembling motion of the human hand.

Engraving for likenesses must be clear, expressive and life-like, showing the white and black of the eyes clearly—the nose, lips, chin, and every feature perfect and well developed. Notice particularly the fine texture of the skin, which has never been successfully counterfeited. It is composed of fine even dots upon the forehead, and is set in perfect dots and lines intermixed upon the face, neck and arms. There are short, fine lines upon the face, neck and limbs, crossing each other at very acute angles, forming what is technically called flesh work. It serves to

round the features and limbs so as to look life-like.

In fact, counterfeiters can never produce a note that will at all compare with the genuine, unless with the aid of the *Geometrical Lathe.*

THE FIRST FLAG.

The construction of the first national standard of the United States, as a design, from which the "Stars and Stripes" was afterward adopted, took place under the personal direction of General Washington, aided by a committee of Congress "authorized to design a suitable flag for the nation," at Philadelphia, June, 1777.

This took place at the residence of Mrs. Ross, a relative of Colonel Ross, in Arch street, between Second and Third, where General Washington and the committee completed the design, and employed Mrs. Ross to execute the work. The house is still standing (239). Mrs. Ross was afterward Mrs. Claypool. Her maiden name was Griscom, and according to the fashion of the time, she was called "Betsy."

Betsy Griscom had, before the Revolution, acquired some knowledge of the "upholder" trade, as it was then called — an occupation synonymous with the modern upholster — and, at the time mentioned, was carrying on business on her own account in her little shop. One day, probably between the 23d of May and the 7th of June, 1777, during which period Washington was in Philadelphia, there came to her the commander-in-chief, the Hon. George Ross, and other gentlemen, members of Congress, who desired to know whether she could make them a flag according to a design which they would produce. She intimated her willingness to try. The design was for a flag of thirteen red and white stripes, alternate with thirteen six-pointed stars. Mrs. Ross expressed her willingness to make the flag, but suggested that the stars would be more symmetrical and pleasing to the eye, if made with five points, and showed them how such a star could be made, by folding a piece of paper and producing the pattern by a single cut. Her plan was approved, and she at once proceeded to make the flag, which was finished the next day. Mrs. Ross was given the position of manufacturer of flags for the government, and for some years she was engaged in that occupation. The business descended to her children, and was carried on by her daughter, Clarissa Claypool, who voluntarily relinquished it on becoming a member of the Society of Friends, lest her handiwork should be used in time of war.

LARGE BELLS.

In making large bells, loudness rather than pitch is the object, as the sound can be conveyed to a much further extent. This accounts for the enormous weight of some of the largest bells. St. Paul's, London, weighs 13,000 pounds; and the bell of Antwerp, 16,000 pounds; Oxford, 17,000 pounds; bell at Rome, 19,000 pounds; Mechlin, 20,000 pounds; Bruges, 23,000 pounds; York, 24,000 pounds; Cologne, 25,000 pounds; Montreal, 29,000 pounds; Erfurt, 30,000 pounds; "Big Ben" at the house of Parliament, 31,000 pounds; Sens, 34,000 pounds; Vienna, 40,000 pounds; Novgored, 69,000 pounds; Pekin, 139,000 pounds; Moscow, 141,000 pounds. But, as yet, the greatest bell ever known is another famous Moscow bell, which was never hung. It was cast

by the order of the Empress Anne in 1653. It lies broken on the ground, and is estimated to weigh 443,772 pounds. It is nineteen feet high, and measures around the margin sixty-four feet. There are few bells of interest in the United States. The heaviest is probably the alarm bell on the City Hall, in New York, weighing about 23,000 pounds.

HISTORY OF CHLOROFORM.

The story of the discovery of the properties of chloroform in England is this: A Mr. Waldie, a chemist and bookseller at Linlithgow, had one day some of the liquid in a saucer, when a gentleman entered the shop with a little dog. The chloroform was placed on the ground to be out of the way, and presently the dog was discovered lying by the side of the saucer, unconscious, and apparently dead. After a time, however, while the stranger was mourning over the loss of his pet, the dog moved his limbs and gradually regained consciousness. Mr. Waldie began to think he had made a discovery, and, after having administered chloroform to a number of cats, with the same result, was confirmed in his belief. He went to Edinburg to relate his story to some medical men, and at the suggestion of a friend, called upon Professor James Y. Simpson. After that interview Simpson tried a number of experiments, and proved beyond all question the virtues of chloroform as an anæsthetic. Professor Simpson published the results of his experiments in 1847, and gave full credit to Mr. Waldie for his share in the matter; but, as the learned physician had previously tried ether, protoxide of nitrogen, and everything in fact that was suspected to have anæsthetic properties, it is more than probable that he would soon have hit upon chloroform.

It was Dr. Simpson who first applied chloroform in child-birth, and for this he is justly celebrated. Although chloroform was discovered by an American, Guthrie, in 1831, and the editor of the *Pharmaceutical Journal*, of Philadelphia, in publishing an account of it, even at that early date, anticipated for it an extensive application in medicine, it was not until the news of Dr. Simpson's experiments reached this country in the winter of 1847, that this valuable compound was introduced as an anæsthetic. The scientific properties of chloroform were first investigated by Liebig and Dumas, and they gave it its present name from its supposed chemical constitution—terchloride of formyle, which was abbreviated to chloroform.—

WHAT HAPPENED ON FRIDAY.

Some people will persist in denominating Friday as "unlucky," notwithstanding that it is the date of some of the most important and most "lucky" occurrences on the record of human transactions. Let us see: On Friday, Aug. 21, 1492, Columbus sailed on his great voyage of discovery. On Friday, Oct. 12, 1492, he first discovered land. On Friday, Jan. 4, 1493, he sailed on his return to Spain, which if he had not reached in safety, the happy result would never have been known which led to the settlement of this vast continent. On Friday, March 15, 1493, he arrived at Palos in safety. On Friday, Nov. 22, 1493, he arrived at Hispaniola, in his second voyage to America. On Friday, June 13, 1494, he, though unknown to himself, discovered the continent of America. On Friday,

March 5, 1496, Henry VIII. of England gave to John Cabot his commission, which led to the discovery of North America. This is the first American State paper in England. On Friday, Sept. 7, 1565, was founded St. Augustine, Florida, the oldest town in the United States by more than forty years. On Friday, Nov. 10, 1620, the May Flower, with the Pilgrims, made the harbor of Provincetown; and on the same day they signed that august compact, the forerunner of our glorious constitution. On Friday, Dec. 22, 1620, the Pilgrims made their final landing at Plymouth Rock. On Friday, Feb. 22, 1732, George Washington, the Father of American Freedom, was born. On Friday, June 16, 1775, Bunker Hill was seized and fortified. On Friday, Oct. 7, 1777, the surrender of Saratoga was made, which had such power and influence in inducing France to declare for our cause. On Friday, Sept. 22, 1780, the treason of Arnold was laid bare, which saved us from destruction. On Friday, Oct. 19, 1781, the surrender at Yorktown, the crowning glory of the American arms, occurred. On Friday, June 7, 1776, the motion in Congress was made by John Adams, seconded by Richard Henry Lee, that the United Colonies were, and of right ought to be, free and independent. Thus we see that Friday is not so bad a day, after all.

THE WONDERS OF A HEN'S EGG.

The following interesting observations that occur from hour to hour during the incubation of the hen's egg are from Saturn's *Reflections:*

The hen has scarcely sat on her eggs twelve hours before some lineaments of the head and body of the chicken appear. The heart may be seen to beat at the end of the second day; it has at that time somewhat the form of a horse shoe, but no blood yet appears. At the end of two days two vessels of blood are to be distinguished, the pulsation of which is visible; one of these is the left ventricle. and the other the root of the great artery. At the fiftieth hour one auricle of the heart appears, resembling a noose folded down upon itself. The beating of the heart is first observed in the auricle, and afterward in the ventricle. At the end of seventy hours the wings are distinguishable; and on the head two bubbles are seen for the brain, one for the bill, and two for the fore and hind part of the head. Toward the end of the fourth day the two auricles already visible draw nearer the heart than before. The liver appears toward the fifth day. At the end of seven hours more the lungs and stomach become visible; and four hours afterward the intestines, and loins, and the upper jaw. At the one hundred and forty-fourth hour two ventricles are visible, and two drops of blood, instead of the single one which was seen before. The seventh day the brain begins to have some consistency. At the one hundred and ninetieth hour of incubation the bill opens, and the flesh is seen in the breast. In four hours more the breast-bone is seen. In six hours after this the ribs appear, forming from the back, and the bill is visible, as well as the gall-bladder. The bill becomes green at the end of two hundred and thirty-six hours; and if the chicken be taken out of its covering, it evidently moves itself. At the two hundred and sixty-fourth hour the eyes appear. At the two hundred and eighty-eighth the ribs are perfect. At the three hundred and thirty-first the spleen draws near to the stomach and the lungs to the chest. At the end of

three hundred and fifty-five hours the bill frequently opens and shuts; and at the end of the eighteenth day the first cry of the chicken is heard. It afterward gets more strength, and grows continually, till at length it is enabled to set itself free from confinement.

HISTORY OF BILLIARDS.

It has been pretty satisfactorily demonstrated that the game was in vogue among the Romans, and particularly cultivated by Consul Lucullus, that elegant and accomplished Roman epicurean, who devoted his colossal fortune to the graces and accomplishments of refined and polite life. Some have referred its introduction to the Emperor Caligula. We have never leaned to this conclusion, because it is hard to believe that so hard-hearted a wretch should have had any agency in introducing so elegant and generous an amusement among his countrymen. There seems to be little doubt that the game of billiards was known to the Romans; and we think it would not be difficult to prove that every hospitable and elegant palace of the Roman citizens had a room devoted to this glorious and inspiring game. Billiards were introduced into France as early as the first crusade, which occurred in 1099. During the reign of Henry III., one of the most luxurious of the French monarchs gave to this amusement the epithet of "the noble game of billiards." With this royal sanction, its fascination soon enthralled all the elegant circles of Europe, and before a quarter of a century had passed, billiards became the favorite amusement of the nobles and principal classes of England, Germany, Italy and Spain. The game was introduced into this country by the cavaliers of Virginia and a few gentlemen of Holland, who became the early possessors of Manhattan Island, then called New Amsterdam. It was cultivated before the Revolution by the most illustrious, intelligent and best educated classes. General Washington devoted to it as many moments of leisure after dinner as the serious occupation of his life allowed. John Quincy Adams, while President, had a billiard table in his house, as one of the luxuries which his hospitality provided for the after-dinner hours of Lafayette.

There is much to be said on the subject of innocent and exhilarating amusement. Physicians and surgeons of the highest rank among all nations have prescribed billiards as the most exhilarating and the most beautiful of all games.

Billiards can be played as a relaxation; it becomes an intense and exciting game only when the mind throws all its energies in that direction, and then it is full, often, of the spirit of heroism. Sir Astley Cooper attributed to the practice of this game, among the families of the English aristocracy, both male and female, their admitted superiority of health, beauty and physical development, over all other races on the earth.

HOW GOLD LACE IS MADE.

In an interesting description of the method of manufacturing gold lace, an exchange pointedly says that gold lace is *not* gold lace; it does not deserve this title, for the gold is applied as a surface to silver. It is not even silver lace, for the silver is applied to a foundation of silk. The silken threads for making this material are wound around with gold wire so thickly as to conceal

the silk. The making of this gold wire is one of the most singular mechanical operations imaginable. In the first place, the refiner prepares a solid rod of silver about an inch in thickness; he heats this rod, applies upon the surface a coating of gold leaf, burnishes this down, applies another coating, burnishes this down, and so on, until the gold is about one-hundredth part the thickness of the silver. Then the rod is subjected to a train of processes which brings it down to the state of fine wire, and it is passed through holes in a steel plate, lessened step by step in diameter. The gold never deserts the silver, but adheres closely to it, and shares all its mutations. It is one-hundredth part the thickness of the silver at the beginning, and it maintains the same ratio to the end. As to the thinness to which the gold-coated rod of silver can be brought, the limit depends on the delicacy of human skill; but the most remarkable example ever known was brought forward by Dr. Wollaston. This was an example of solid gold wire, entirely free from silver. He procured a small rod of silver, bored a hole through it from end to end, and inserted in this hole the smallest gold wire he could procure. He subjected the silver to the usual wire-drawing process, until he had brought it to the finest attainable state, being, in fact, a silver wire as fine as a hair, with a gold wire in its center. To isolate this gold wire, he subjected it to warm nitrous acid, by which the silver was dissolved, leaving a gold wire one-thirty thousandth of an inch in thickness — perhaps the thinnest round wire that the hand of man ever produced. But this wire, though beyond all comparison finer than any employed in manufactures, does not approach in thinness the fine film of gold on the surface of silver in gold lace. It has been calculated that the gold on the finest silver wire for gold lace is not more than one-third of one-millionth of an inch in thickness, that is, not above one-tenth the thickness of ordinary gold leaf.

THE CAMPHOR TREE.

The tree from which camphor is obtained belongs to the family of guttiferous productions. It grows abundantly in the forests of Sumatra and Borneo. It is one of the strongest and loftiest trees of those countries. Its bark is of a brownish hue; its leaves resemble those of the camphor tree of Japan; its leaves and its seeds send forth a powerful smell resembling that of turpentine. The trunk can attain a diameter of from six to seven feet. When the tree has attained the size of a poplar, which is seven or eight years old, it yields camphor, but in a small quantity. Before that age it produces only a thick oil, which, according to the inhabitants of these countries, is the first state through which the camphor passes. There is no way of exactly recognizing the trees which contain the one or the other of those substances. Nevertheless, when old trees are pierced camphor is almost invariably found. It is usually met with in hollows, very close to the heart, exactly as resin is met with in other trees. These hollows or pockets would seem, by the irregularity of their form, by their extent and by their volume, to be rather a diseased affection peculiar to the tree than a natural property; but this is not the case. The manner of procuring this resinous substance consists in sounding the trees by means of a deep incision at their base, and going nearly as far in as the heart. If nothing but

oil flows out the tree is immediately abandoned, because, as already stated, at the end of seven or eight years it yields camphor. As many as twenty or thirty trees, sometimes more, are thus mutilated before a tree containing the matter sought for is found. Every tree supposed to contain camphor is cut down, then divided into pieces from one to two inches in length then transversely cleft into two or four parts, to obtain the camphor. Most of the camphor which circulates in commerce comes to us from Japan or China. It is procured from the *Laurus Camphora*. It is obtained by cutting the wood into chips which is then submitted to the action of heat.

THE FOURTH OF MARCH.

How the Presidential Term came to Run from that Day.

It is purely accidental that the beginning of our Presidential term of four years and the beginning of our Congressional term of two years fall on the 4th of March. The old Continental Congress, by a resolution passed on the 13th of September, 1788, appointed the first Wednesday of the next January for the choice of Presidential electors, the first Wednesday of February for the election of President and Vice President, and the first Wednesday of March as the time and New York as the place for the organization of the government under the new constitution. The first Wednesday of March in 1789 happened to be the 4th day of March, and as by the constitution the President is chosen for four years, and the representatives for two years, it follows that, as their functions began then on the 4th of March, they have ever since terminated at midnight on the 3d of March, without reference to the day of the week. It made no difference with those constitutional conclusions that practically Vice President Adams was not inaugurated till April 21, nor President Washington till April 30, 1789. The delay was caused by the non-appearance at the proper time of a quorum in either house of Congress, the house having been able first to organize March 30 and the Senate April 6, and they jointly proceeded on this latter day to count and announce the votes for President and Vice President.

By the law of 1845, the time for choosing the Presidential electors is Tuesday following the first Monday in November every fourth year; the electors must cast their ballots on the first Wednesday in December, their votes must all be in by the first Wednesday in January; they must be counted by the two houses on the first Wednesday in February; and the inauguration takes place, rather constitutionally than legally, on the 4th of March.

PIN MONEY.

In 1614, the London pin-makers, desiring to obtain a charter of incorporation, promised Sir Ralph Winwood four thousand pounds, or a moiety of the profits on the commerce in pins, if he would use his influence in their behalf; and two years later, they got their charter confirmed, securing the sole pre-emption of foreign pins, which were forbidden to be landed in any port but London. At this time they were associated with the wire-makers and girdlers (makers of girdles or belts), but in 1631 were at their own desire separated from them. In 1635, upon the renewal of their privileges by Charles I., the pinners covenanted to

pay his majesty five hundred pounds a year forever; which Charles disposed of by giving it as a pension to his queen. Charles II. confirmed this charter upon regaining the throne, and subsequently entered into a curious contract with the pinners, by which he bound himself to raise twenty thousand pounds to provide a stock of wire, and to take all the pins they made at prices fixed by the Lord Treasurer; the pinners, on their part, undertaking to deliver seventy thousand pounds weight of ordnance half-yearly to the Master of the Ordnance (receiving ten thousand pounds at the expiration of the contract), and to pay five hundred a year to Sir Edward Butter, and a fifth of that amount to Sir William Killigrew—that couple of gentlemen making a nice thing out of what Killigrew called "the pin business."

From the custom of husbands, in the days when pins were precious things, allowing their wives so much money, for their purchase, sprang the term "pin money," afterwards applied to the income settled upon a woman on her marriage for her own proper use. Addison did not approve of pin money. He says:—

"In proportion as a woman is more or less beautiful, and her husband advanced in years, she stands in need of a greater or less number of pins, and upon a treaty of marriage, rises or falls in her demands."

THE POSTAL CARD.

The origin of the present postal card illustrates the truth of the adage how great events may come from little things. Mr. Rowland Hill, the great English postal reformer, is the pioneer to whom the world is indebted for this valuable institution. It was suggested to Mr. Hill by the following incident: One day while standing near a humble door he saw a poor woman look long and earnestly at a letter and then decline it. Curious to know the cause, he waited till the postman had gone, and then received the information that the letter was all on the outside; that she and her husband had agreed upon a system of signs, such as variations in the lines and characters, by which she could learn that he was well, or ill, or coming home soon, or wished her to come to him, and so on. Struck with the hardships which the want of proper postage must inflict on the poor, the great man conceived the idea of the penny postage; and so the world is indebted, like the Chicago fire, to a poor woman—in the one case for a vast calamity, in the other for a great blessing.

HISTORY OF THE PIANO-FORTE.

A useful and interesting History of the Piano-Forte has recently appeared in London, and, as a concise account of what is *the* musical instrument of the age, supplies a want that has long been felt. From it we learn that the first instrument with a clavier, or finger key-board, was the organ, which, in a very crude guise, is recorded as early as 757; and about the year 1300 some ingenious Italian applied the same means of action to a kind of harp or lyre, with hard leather plectra for snapping the strings. Simultaneously with this appeared the clavichord, in which vibration was induced by a wedge of brass striking the string. Forkel, a celebrated writer on ancient music and musical instruments, says that the great Sebastian Bach delighted in this instrument, as he con-

sidered it the best for study and for the expression of his thoughts. In England the clavichord was superseded by the virginal and spinet—instruments identical with it in detail, differing only in form. The virginal was popular in court circles during the Tudor reigns—Henry VIII., his daughters Mary and Elizabeth, and Mary Queen of Scots, being proficient performers on it. To the virginal and spinet, with but one string to each note, succeeded the harpsichord, with two, and sometimes three or four wires to a note, actuating stops, and other complicated apparatus. The piano-forte proper, with its elastic percussion and damper action, such as we now have it in an important form, first saw the light in Italy. According to some, Father Wood, an English monk, at Rome, constructed the first in 1711; but priority of invention is claimed by both French and Germans. The following extract is taken from an old play-bill, still in existence, and is interesting as being the first notice we have of a public performance on the piano-forte:

FOR THE BENEFIT OF MISS BRICKLER,

16th of May, 1767.

* * At the end of the first act, Miss Brickler will sing a favorite song from "Judith," accompanied by Mr. Dibdin on a *new instrument, called the piano-forte.*

Its invention, like many others, is disputed; and England, France, Italy, and Germany, claim to have a share in the honor. Pianos were certainly made for the first time in the four countries within a very few years of each other; but in Germay alone did they succeed. Silbermann improved upon the invention of Schroeter, and constructed pianos which met with Bach's approbation. From this dates the success of the piano in Germany. Frederick the Great had no less then forty of Silbermann's pianos in his palace at Berlin; and when Bach visited him he insisted upon the old man trying every one. Stein of Augsburg was also a celebrated maker; and Mozart, in one of his letters, describes the care taken by Stein in seasoning the wood, which was exposed to all sorts of weather, and afterwards had all the cracks filled up with slits of wood glued into them. In England, the piano made no sensible progress until 1760, when twelve German workmen—afterwards called the "twelve apostles"—arrived in search of employment. Dibdin, at a concert in 1767, played on the first piano publicly exhibited, and after that the instrument became very popular, and harpsichords more and more in disrepute. Sebastin Erard made a great improvement in the touch; and Broadwood, who came to London from Scotland in 1751, introduced what he called his "grand action," which improved many defects. From that day until the present the piano has been improving.

POWER OF SEA BREAKERS.

From experiments which were made some time since, at the Bell Rock and Skerryvore lighthouses, on the coasts of Scotland, it was found that while the force of the breakers on the side of the German Ocean may be taken at about a ton and a half upon every square foot of surface exposed to them, the Atlantic breakers fall with double that weight, or three tons to the square foot; and thus a surface of only two square yards sustains a blow from a heavy Atlantic breaker equal to about 54 tons. In November, 1824, a heavy gale blew, and blocks of limestone and

granite, from two to five tons in weight, were washed about like pebbles, at the Plymouth breakwater. About 200 tons of such blocks were borne a distance of 300 feet, and up the inclined plane of the breakwater, carried over it, and scattered in various directions. A block of limestone, seven tuns in weight, was in one place washed a distance of 150 feet. Blocks of three tons weight were torn away by a single blow of a breaker, and hurled over into a harbor; and one of nearly two tons, strongly trenailed down upon a jetty, was torn away and tossed upwards by an overpowering breaker.

THE ARTS OF A HUNDRED YEARS AGO.

One hundred years ago, what a man discovered in the arts, he concealed. Workmen were put upon oath, in the name of God, never to reveal the process used by their employers. Doors were kept closed, artisans going out were searched, visitors were rigorously excluded from admission, and false operations blinded the workmen themselves. The mysteries of every craft were hedged in by thickset fences of empirical pretensions and judicial affirmation. The royal manufactories of porcelain, for example, were long carried on in Europe with a spirit of jealous exclusiveness. His Majesty of Saxony was especially circumspect. Not content with the oath of secrecy imposed upon his work-people, he would not abate his kingly suspicion in favor of a brother monarch. Neither king nor king's delegate might enter the tabooed walls of Meissen. What is erroneously called the Dresden porcelain — that exquisite pottery of which the world has never seen the like — was produced for two hundred years by a process so secret that neither the bribery of princes nor the garrulity of the operatives ever revealed it.

Other discoveries have been less successfully guarded, fortunately for the world. The manufacture of tinware in England originated in a stolen secret. Few readers need to be informed that tinware is simply thin iron plated with tin by being dipped into the molten metal. In theory it is an easy matter to clean the surface of iron, dip it into a bath of the boiling tin, and remove it, enveloped with the silvery metal, to a place for cooling. In practice, however, the process is one of the most difficult in the arts. It was discovered in Holland, and guarded from publicity with the utmost vigilance for nearly half a century. England tried in vain to discover the secret, until James Sherman, a Cornish miner, crossed the Channel, insinuated himself master of the secret, and brought it home. The secret of manufacturing cast-steel was also stealthily obtained, and it is now within the reach of all artisans.

Another stolen secret is the method of making citric acid. The inventor of the process — who was a resident of London, England — for a long time enjoyed the monopoly of his invention. More favorably circumstanced than other inventors, his was a process that required no assistance. He employed no workmen. Experts came to sample and assort and bottle his products. They never entered his laboratory. The mystic operations by which he grew rich were confined to himself. One day, having locked the doors and blinded the windows, sure as usual of the safety of his secret, the chemist went home to dinner. A chimney-sweep, or a boy distinguished as such,

wide awake in chemistry, was on the watch. Following the secret-keeper so far on his way toward Charing Cross as to be sure he would not return that day, the sooty philosopher hied rapidly back to Temple Bar, ascended the low building, dropped down the flue, saw all he wanted, and returned, carrying with him the mystery of making citric acid. The monopoly of the inventor was gone, a few months after, and the price of the article was reduced four-fifths. The poor man was heart-broken, and died shortly afterward, ignorant of the trick by which he had been victimized. He was to be pitied as an individual sufferer; but the wheel of progress is bound to crush all obstacles which threaten to impede its course, sacrificing the man to the needs of the multitude. Fortunately, inventors of the present day can work openly, and enrich themselves while they benefit others.

VIOLIN STRINGS.

The manufacture of strings for musical instruments has been carried on from time immemorial in some of the small villages in the Abruzzi, and at the present time the Neopolitan provinces maintain their superiority in the production of this article. They require the greatest care and dexterity on the part of the workman.

The treble strings are particularly difficult to make, and are made at Naples, probably because the Neopolitan sheep, from their small size and leanness, afford the best raw material. They are made from the small intestines, which must be well scraped. The intestines are then steeped in alkaline lyes, clarified with a little alum for four or five days, until the guts are well bleached and swollen. They are next drawn through an open brass thimble, and pressed against it with the nail, in order to smooth and equal their surface; after which they are washed, spun or twisted, and sulphured during two hours. They are finally polished by friction, and dried. Sometimes they are sulphured twice or thrice before being dried, and are polished between horse-hair cords.

The strings manufactured in Italy are noted for their strength, transparency, brilliancy and clearness of tone. This manufacture was introduced into France by a Neopolitan nobleman, in 1767, who established a manufactory at Lyons. This industry is carried on in various other towns in Italy; namely, Guibbio, Foligno, Bologna, Venice, Vicenza, Verona and Bassano.

THE FORTUNES OF OUR PRESIDENTS.

Washington left an estate worth nearly $300,000. John Adams left a moderate fortune at his death. Jefferson would have died poor if Congress had not purchased his library at a price far above its value—$20,000. Madison, by the purchase of his manuscript papers by Congress for $30,000, increased the fortune of his widow. James Monroe died so poor that he was buried at the expense of his relatives. John Quincy Adams left about $50,000. He was methodical and economical. Andrew Jackson left a valuable estate known as the Hermitage. Martin Van Buren died rich; his estate was worth $300,000. James K. Polk left about $150,000. John Tyler was a bankrupt when he became President. He married a rich wife and died wealthy. Zachary Taylor left about $150,000. Millard Fillmore died a wealthy man. Franklin Pierce saved about $50,000. James Buchanan left an estate valued at $200,000. Abraham Lincoln left

about $75,000. Andrew Johnson was worth about $50,000. Grant, through the generous gifts of friends before he became President and the large sale of his Memoirs, which he finished just previous to his death, added a large amount to his estate. Garfield left about $75,000. Arthur was a very careful business man, and his estate was supposed to be worth $75,000.

TYPE-WRITER.

This almost indispensable article is not comparatively new, as many would naturally suppose. A patent was issued to Thurber, No. 3228, August 26, 1843, also to same party, No. 4271, November 18, 1845; one to Fairbank, No. 7652, September 17, 1850. An English patent was granted as early as 1714, No. 395, also one, No. 9204, in 1841 and 1843.

DEATH OF ENGLISH KINGS.

William the Conqueror died from enormous fat, from drink, and from the violence of his passions.

William Rufus died the death of the poor stags which he hunted.

Henry I. died of gluttony.

Henry II. died of a broken heart, occasioned by the bad conduct of his children.

Richard Cœur de Lion, like the animal from which his heart was named, died by an arrow from an archer.

John died, nobody knows how; but it is said from chagrin, which we suppose is another term for a dose of hellebore.

Henry III. is said to have died a "natural death."

Edward I. is likewise said to have died a "natural sickness,"—a sickness which would puzzle all the College of Physicians to denominate.

Edward II. was most barbarously and indecently murdered by ruffians employed by his own mother and her paramour.

Edward III. died of dotage, and Richard II. of starvation—the very reverse of George IV.

Henry IV. is said to have died of "fits caused by uneasiness;" and uneasiness in palaces in those times was a very common complaint.

Henry V. is said to have died of "a painful affliction, prematurely." This is a courtly term for getting rid of a king.

Henry VI. died in prison, by means known then only to his jailor, and now known only to Heaven.

Edward V. was strangled in the tower by his uncle, Richard III.

Richard III. was killed in battle.

Henry VII. wasted away as a miser ought to.

Henry VIII. died of carbuncles, fat and fury.

Edward VI. died of a decline.

Queen Mary is said to have died of a broken heart.

Old Queen Bess is said to have died of melancholy, from having sacrificed Essex to his enemies.

James I. died of drinking and the effects of vice.

Charles I. died on the scaffold.

Charles II. died suddenly—it is said of apoplexy.

William III. died from consumptive habits of body, and from the stumbling of his horse.

Queen Anne died from dropsy.

George I. died of drunkenness, which his physicians politely called an apoplectic fit.

George II. died of a rupture of the heart, which the periodicals of that day termed a visitation of God.

George III. died as he had lived—a madman. Throughout life he was at least a consistent monarch.

George IV. died of gluttony and drunkenness.

William IV. died amidst the sympathies of his subjects.

BORAX.

It may be interesting to some to know that a weak solution of borax water snuffed up the nostrils, causing it to pass through to the nasal passage to the throat, then ejecting it from the mouth, will greatly relieve catarrh, and in cases not too obstinate or long standing will, if persevered in, effect a permanent cure. It is also of great value in cases of inflamed or weak eyes. Make a solution (not too strong) and bathe the eye by opening and shutting it two or three times in the water. This can be done by means of an eye cup, or equally well by holding a handful of water to the eye. Another difficulty with which many persons are afflicted is an irritation or inflammation of the membrane lining of the cavities of the nose, which becomes aggravated by the slightest cold, often causing great pain. This can be greatly relieved, if not entirely cured, by snuffing borax water up the nostrils two or three times a day. The most difficult cases of sore throat may be cured by using it simply as a gargle. As a wash for the head, it not only leaves the scalp very white and clean, but renders the hair soft and glossy. It has also been found by many to be of invaluable service in case of nervous headache. If applied in the same manner as in washing the hair the result is wonderful. It may be used quite strong, after which rinse the hair carefully with clear water; let the person thus suffering remain in a quiet, well-ventilated room, until the hair is nearly or quite dry, and, if possible, indulge in a short sleep, and there will hardly remain a trace of the headache. If clergymen, teachers and others who have an undue amount of brain-work for the kind and quality of physical exercise usually taken, would shampoo the head in this manner about once a week, and then undertake no more brain work until the following morning, they would be surprised to find how clear the faculties had become, and there is reason to hope there would be much less premature decay of the mental faculties. As a toilet requisite it is quite indispensable. If used to rinse the mouth each time after cleaning the teeth, it will prevent the gums from becoming diseased or unclean. In short, in all cases of allaying inflammation there is probably nothing better in *materia medica*. The average strength of the solution should be a small teaspoonful to a toilet glass of water.

A DOMESTIC RECIPE.

A father, who had passed innumerable sleepless nights, has immortalized himself by discovering a method of keeping babies quiet. The *modus operandi* is as follows: as soon as the squaller awakes, set it up, propped by a pillow, if it cannot sit alone, and smear its fingers with thick molasses; then put half a dozen feathers into its hands, and it will sit and pick the feathers from one hand to the other until it drops asleep. As soon as it wakes again, more molasses and more feathers; and in place of the nerve astounding yells, there will be silence and enjoyment unspeakable.

INVENTION OF THE SPIRIT LEVEL.

He who first filled a glass bottle with a liquid, leaving a small quantity of air therein to form a bubble, then corked the bottle and laid it flat on one side, with the bubble floating against the upper part, was the unconscious inventor of the spirit level, which is a very simple instrument in appearance, but of the utmost value, when properly made, to the astronomer, the engineer and the builder; for when the bottle is placed horizontally, the bubble always mounts to and rests at its most elevated point; and the tangent to that point, when the middle or apex point of the bubble coincides therewith, is a horizontal line; that is, a line at right angles, or perpendicular to the direction of gravity or the plumb line passing through that point.

This was first perceived and applied, so far as is known, in France in 1666, by Melchisedec Thevenot, who was a great amateur of science and a writer of books of voyages and travels. In this respect he enriched the literature of France as much as Hakluyt enriched that of England half a century earlier. It was at Thevenot's house that the learned men who founded the Academy of Sciences of Paris used to assemble; and it was at one of their meetings that he propounded the spirit level.

A description of the instrument, accompanied with figures, was first published in the *Journal des Savants,* Paris, November 15, 1666, under this title: "*Machine nouvelle pour la conduite des eaux, pour les batiments, pour la navigation, et pour la plupart des autres arts.*" The instrument is there called an air level; and is described as a glass tube, hermetically sealed at both ends, containing spirits of wine, which do not freeze, and a small quantity of air forming a bubble. It is stated that the instrument is capable of giving, with much exactness, the direction of the horizon, the perpendicular to the horizon, and vertical angles; and that it is easier to make, more convenient to use, and indicates a level line more readily and accurately than any other instrument.

ECONOMY OF THE ARTS.

The horse-shoe nails dropped in the streets, carefully collected, reappear in form of swords and guns. The clippings of tinkers' shops mixed with the parings of horses hoofs, or cast-off woolen garments, appear afterwards, in the forms of dyes of the brightest blue, in the dress of courtly dames. The bones of dead animals yield the chief constituents of lucifer matches —phosphorus. The dregs of port wine, carefully rejected by the port wine drinker in decanting his favorite beverage, are taken by him in the form of seidlitz powders. The washings of coal gas re-appear carefully preserved in the lady's smelling-bottle as an ammoniacal salt.

CHEAP ICE PITCHER.

Place between two sheets of paper (newspaper will answer, thick brown is better) a layer of cotton batting about half an inch in thickness, fasten the ends of paper and batting together, forming a circle, then sew or paste a crown over one end, making a box the shape of a stove-pipe hat minus the rim. Place this over an ordinary pitcher filled with ice-water, making it deep enough to rest on the table, so as to exclude the air, and the reader will be astonished at the length of time his ice will keep and the water remain cold after the ice is melted.

FOOLSCAP.

The origin of "foolscap" paper is not generally known. Charles I. of England granted numerous monopolies for the support of the government. Among others was the manufacture of paper. The watermark, of the finest sort, was the royal arms of England. The consumption of this article was great at this time, and large fortunes were made by those who had purchased the right to vend it. This, among other monopolies, was set aside by the Parliament that brought Charles I. to the scaffold, and as one way of showing their contempt for the King, they ordered the royal arms to be taken from the paper, and a fool with his cap and bells to be substituted. It is now over two hundred years since the fool's cap and bells were taken from the paper; but still the paper of the size which the Rump Parliament ordered for their journals bears the name and water-mark as an indignity to Charles I.

EXPLANATION OF TERM "CARAT."

The word carat comes from the Abyssinian name for bean. It corresponds in weight with a certain species of East Indian bean, and was originally only used as a weight, in the same manner as our word grain comes from a grain of wheat, and has also its average weight. The exact relation of the carat to the grain, Troy weight, is, in round numbers, as 4608 to 1185, or, in other words, 1185 carats are equal to 4608 grains Troy; by division of the last number by the first, we find for the weight of a carat 3.88 grains very nearly. This is the weight by which jewellers *sell* diamonds; but when they *buy* them, however, they count by round numbers of grains, and use four grains for a carat. The carat is now only used for the weight of precious stones and pearls, because the grain is too small. In ancient times, it was used as the unit of weight for gold; but is now, by the greater abundance of that precious metal, superseded by the ounce. In regard to the alloy of gold, it has been accepted to take 24 carats of gold, or 93 grains very near, as the standard of pure gold; and to call gold in which 20 carats in 24 carats are pure gold, gold of 20 carats; when $\frac{3}{4}$ is pure, or 18 carats in 24 carats, it is called 18 carats. So, in regard to the alloy of gold, the word carat has become similar to the expression of a percentage, with the difference that 24 is substituted for 100. So 18 carats is identical to 75 per cent. fine, 12 carats to 50 per cent. fine, etc. That this manner of estimating the value is kept up, is simply due to the custom of following the duodecimal system in making alloys; when using the decimal weights and divisions, we are naturally driven to expressions like 80 and 90 per cent. fine, as is done in almost all mints in the civilized world.

BOXWOOD.

Boxwood, as is well known, grows in different parts of the world. The bulk, however, of that which is used in this country is imported from Turkey. The growth of the tree is slow. If it be twelve inches in diameter, its age is to be numbered by centuries for it is above 500 years old. Those trees which attain a diameter of eighteen inches are about 1,000 years old. Block makers prefer trees eight to ten inches in diameter. The wood is sold by the ton, is very costly, and is of such various qualities that not more than an

eighth or a tenth part of a ton is suitable for the finest engravings.

The best quality of wood is of a bright canary color, the texture fine and close, and the surface free from dark markings; great care is required in preparing the blocks. After the wood in the blocks has been sawn up into sections of a proper thickness, and becomes thoroughly seasoned, it is ready to be cut into blocks, and here one may see what an amount of waste wood there is. Checks and other imperfections require close cutting of the sound wood, and as these pieces are necessarily small, several must be joined together to form a large block.

Blocks, the size of our fashion plates, are composed of from four to six different pieces, fitted, doweled, and glued together with such extreme nicety as to present the appearance of a solid piece. Large blocks are generally joined together with screws, so as to admit of being taken apart for engraving, and re-united when ready for the printer.

THE COW POX.

How the Vaccine Matter is Manufactured.

The room in which the heifers are kept is light, warm, and airy — a perfectly finished room, indeed, with plastered walls and ceiling, and the stalls are built with as great regard to comfort and neatness as those of a gentleman's stable. Dry sawdust is furnished for bedding, and the best hay, with meal mashes, for food. Under the large south window stands a peculiar "operating table," with a top which folds down, two projecting arms then coming to the floor, as if forming extra legs. The heifer selected is led out, placed alongside this table, and its fore feet secured by fastenings already attached to one arm, and its hind legs in like manner to the other. A stout belt encircles its body and the flat top of the table, and a halter and neck strap holds its head in place at one corner. Then the whole top is tilted up to place and secured, aud the bovine martyr to science is recumbent on one side upon the top of the table. A portion of its abdomen, about the size of two full-grown hands, is then shaved clean, and the vaccine virus from another heifer, at the seventh day of the disease, is inserted in little punctures arranged in rows an inch apart each way. The table-top is again canted down, and the little beast released and installed till six or seven days after, when its vesicles are ripe for the supply of lymph to another heifer and the human race in general. It is then replaced on the table, and the operator, taking a box of small ivory points prepared for that purpose, a rack for the same to dry on, and a pair of peculiar-shaped, slim pliers, seats himself at the side of the table. With the pliers he gently squeezes each pustule in turn, and as the lymph oozes forth carefully collects it on the ivory points. From a good yielding animal several hundred points can be charged. This done, the heifer returns to her stall and remains a few days longer, when the "crusts," having matured, are carefully taken off and mounted in gutta percha, for the use of those physicians who prefer this form of administration. The heifer then, having fulfilled her mission, returns to private life. The operation is conducted with such care to avoid unnecessary suffering, or even inconvenience to the animal, that it frequently goes to sleep on the table, and does not evince any pain. Two agents for the prevention of cruelty to animals recently visited the place, and

after seeing the whole process, declared themselves satisfied that no cruelty was inflicted. The ivory points, after being charged and becoming dry, are carefully placed, ten in a bunch, and wound in cotton fiber. Then white paper is wrapped around them, and lastly rubber tissue, which is tied at the end, producing a water-tight and air-tight package. These, then, are packed in any desired quantity, and shipped to fill orders.

THE ORIGIN OF "GROG."

Until the time of Admiral Vernon the British sailors had their allowance of brandy or rum served out to them unmixed with water. This plan was found to be attended with inconveniences on some occasions, and the admiral therefore ordered that in the fleet he commanded, the spirit should be mixed with water before it was given to the men. This innovation at first gave great offense to the sailors, and rendered the commander very unpopular. The admiral at that time wore a grogham coat, and was nicknamed "Old Grog." This name was afterward given to the mixed liquor he compelled them to take, and it has hence universally obtained the name of grog.

EXTINCT FAMILIES.

Robert Stephenson leaves no family behind him. His wife died many years ago, and he remained a widower, so that the direct line from George Stephenson, the eminent English engineer, has died out. James Watt, the noted British inventor, left no descendants. It appears that the men noted for mechanical genius, like many of those famous in literature, science and government, in Great Britain, leave no children to perpetuate their names. Shakespeare, Milton, Bacon, Newton, Harvey, Pope, Mansfield, Pitt, Fox, Gray, Cowper, Collins, Thomson, Goldsmith, Congreve, Hume, Bishop, Butler, Locke, Hobbs, Adams, Smith, Bentham, Davy, Sir Joshua Reynolds, Sir Thomas Lawrence, and others well known to fame in British annals, have no lineal representatives now living.

HOW GLASS PAPER WEIGHTS ARE MADE.

Every one knows those paper weights of solid, colorless glass, in a hemispherical shape, in the center of which are boquets, portraits, and even watches and barometers, etc., but few persons know how or by what means these things are incarcerated in the center of the glass. There is a great distinction to be made, not merely between the objects, but also between the materials of which they are composed. As those representing flowers and boquets in glass — those from which the name is derived — are the most ancient and the best known, we will begin with them.

The first thing to be done is to sort and arrange a certain quantity of small glass tubes of different colors in the cavities of a thick molten disk, disposing them according to the object to be represented. This done, the tubes are inclosed between two layers of glass. To do this they begin by placing on one side of the disk which contains the tubes, a layer of crystal, to which the tubes soon become attached. When this is done the disk is removed and a second layer of crystal is placed on the opposite side. The object being placed in the center be-

tween these two layers of glass thus soldered together, it becomes necessary to give the ball its hemispherical form, which is done when the crystal is again heated, by means of a concave spatula of moistened wood. It then only remains to anneal and to polish it on the wheels.

That a glass ornament, being covered with a layer of hot glass, should receive no injury of color, may be easily understood from its extremelv refractory nature; but it is not the same with objects in metal, such as watches, barometers, etc., which a far less degree of heat would oxidize or even entirely destroy. The mode of manufacture, therefore, of these latter objects is quite different from that of the first. It is easy to prove this. If we look at a paper weight, provided the interior be of glass, the upper and under part of the recipient will also be of glass. If we now examine a paper weight containing a watch or barometer, under the lower part of the ball will be found a piece of green cloth, the use of which is to keep in place the objects which, instead of only forming one body with the covering of glass which surrounds them, are only placed in a cavity made beforehand in the center of the half spherical ball. In a word, to take out the glass ornaments, it would be necessary to break the paper weight, whilst to take out the others it would suffice to take off the cloth. As for the paper weights in which are placed portraits, usually of a yellowish color, these profiles are made of refractory earth, and many thus bear well a heat which only softens glass. Manufactured successively at Venice under the name of milleflori, and then in Bohemia, these paper weights have been carried to perfection only by French artists. The sole difficulty in their manufacture is in avoiding internal air bubbles, which would the more deform the objects, as any defect would be much increased by the thickness of the glass.

WHAT IS MEANT BY A HORSE POWER?

The power of prime movers is measured by horse power Watt found that the strongest London draft horses were capable of doing work equivalent to raising 33,000 pounds one foot high per minute, and he took this as the unit of power for the steam engine. The horse is not usually capable of doing so great a quantity of work. Rankine gave 26,000 foot pounds as the figure for a mean of several experiments, and it is probable that 25,000 foot is a fair minute's work for a good animal. It would require five or six men to do the work of a strong horse. Watt's estimate has become, by general consent among engineers, the standard of power measurement for all purposes.

"ROSIN THE BOW."

Col. W. H. Sparks, a resident of New Orleans, claims to be the original author of this famous song. In a letter from him on the subject, he says that in 1826 he located in Mississippi, and began practicing law. After speaking of his neighbors, he says:

"Among these were two equally remarkable, but very unlike. One was a school-master, who was quite old, and had been teaching in that neighborhood over forty years. His name was James Rossum. He was peculiar in his habits. On Monday morning, neatly dressed and cleanly shaven, he went to his duties in the old schoolhouse where two-thirds of his life had been spent, and assiduously devoted

himself to the duties of his vocation until Friday evening. On the morning of Saturday he arrayed himself in his best and devoted the day in visiting the ladies of the neighborhood. He was a welcome guest at every house This habit had continued so long that he had acquired the sobriquet of 'Rossum, the Beau.' The other's name was Cox, who was a rollicking, good fellow, and the best vocalist I ever knew. He was in song what Prentiss was in oratory, and they were boon companions; both died young.

"Cox was frequently at my office, and upon one occasion when he was there Rossum walked by the door, and his age was apparent in his walk. Cox looked at him, and, after a pause, turned to me and remarked in quite a feeling tone, which he could assume at pleasure, and its eloquence was indescribable: 'Poor old Rossum! some of these sunny mornings he will be found dead, when he shall have a noble funeral, and all the ladies will honor it by being present, I know.'

"Soon after he left the office, and being in the humor, I seized the ideas and wrote the following doggerel lines. Soon after Cox returned, and I handed them to him. He got up, walked and hummed different airs, until he fell upon the old Methodist hymn tune, in which they have ever since been sung.

"I have always considered Cox more entitled to the authorship of the song than myself.

"Hundreds of lines have been written to the air, by as many persons, and almost as many have claimed the authorship of the lines; but this is of no moment. I claim no merit for my lines, but everything for Cox singing them. I have seen him draw tears from the eyes of old and young, with the feeling he threw into the song:

"Now, soon on some soft, sunny morning,
The first thing my neighbors shall know,
Their ears shall be met with the warning—
Come bury old Rossum, the beau.

"My friends then so neatly shall dress me
In linen as white as the snow—
And in my new coffin shall press me,
And whisper: Poor Rossum, the beau.

"And when I'm to be buried, I reckon,
The ladies will all like to go;
Let them form at the foot of my coffin,
And follow old Rossum, the beau.

"Then take you a dozen good fellows,
And let them all staggering go;
And dig a deep hole in the meadow,
And in it toss Rossum, the beau.

"Then shape out a couple of dornicks,
Place one at the head and the toe;
And, pray, do not fail to scratch on it,
The name of old Rossum, the beau.

"Then take you these dozen good fellows,
And stand them all round in a row;
And drink out of a big-bellied bottle,
'Farewell to old Rossum, the beau.'"

THE HISTORY OF THE STOVE.

For an article of such general use, so indispensable in every household, it is astonishing how brief has been the history of stoves. With all of its multiplicity of forms, patterns, and varieties, it is a creation of the present age—a modern convenience—which our grandfathers knew naught of. The Troy *Times* thus relates the history of stoves in general:

"Stoves are comparatively of recent general use, though they were known in this country as early as 1790. In that year a Mr. Pettibone, of Philadelphia, was granted a patent for a stove, which was claimed to be capable of warming houses by pure heated air. Pettibone's stove was soon after put up in the almshouse at Philadelphia, and Drs. James and Chapman, and several members of Congress, gave testimonials of its utility for warming

and ventilating churches, courts of justice, hospitals, manufactories, etc. This was probably the first attempt to use stoves, at least in this country. From this time forward for many years, the stove was confined to public places, its use for warming private houses, or for cooking purposes not having been thought of. The long box stove, capable of taking three feet wood, was the only stove our ancestors knew anything about.

Cooking stoves have come in use within the last few years. The first advance toward a cooking stove was making the Franklin stove with an oven; and the first that deserves the name of cooking stove was an oblong affair having an oven running the whole length, the door of which was in front and directly over the door for supplying fuel, and having also a boiler-hole and a boiler on the back part of the top near the pipe. Then a stove similar in arrangement, with swelling or elliptical sides, was made, generally called the nine-plate stove. About the year 1812 cooking stoves were made at Hudson from patterns made by a Mr. Hoxie, who was the first to elevate the fire-box above the bottom. This improvement was patented, and was sustained in suits against parties who in any way elevated fire from the bottom. In Hoxie's cooking stove the fire was made above and upon the the oven, and he was the first who made any stove in which the flame was made to descend from the top to the bottom of the oven. In 1815, William T. James, of Lansingburg, afterward of Troy, made the stove known as the "James Stove," which not only continued a leading cooking stove for nearly a quarter of a century, but may yet be seen on board of small eastern coasting vessels, where, being cheap durable, it supplies the place of a caboose. James stove is probably better known as the "Saddle Bags Stove."

The first heating of houses by flues, from anthracite coal, was accomplished by a Professor Johnson, of Philadelphia, about 1825. The Professor succeeded in heating a large house by means of a furnace in a cellar, surrounded by an air chamber of brick work, whence the gaseous products of combustion were carried through the building, passing through cylindrical drums on the first and third floor, and out at the top. This mode of warming buildings rapidly grew into favor as our people came to be well acquainted with coal.

The ample supply of wood in the country was for many years in the way of the successful introduction of stoves. This fuel was at every man's door, and houses were all supplied with ample fire places. The cost of preparing wood for stoves was an item which quite offset any economic advantages they had otherwise. And, besides, the people were loth to give up the cheerful, open fire place for "a little black box in the corner," as the stove was disparagingly called. Even now the West uses few stoves compared with the East; and Eastern manufacturers make stoves adjusted to wood for the Western market, while those for the market of the Central and Middle States are nearly all coal burners.

ORIGIN OF THE WORD TARIFF.

Prof. Perry, in a recent address before a Western agricultural society, gave an interesting historical sketch of the orgin of the word tariff. There is a town in Spain, in the narrowest part of the Straits of Gibralter, named

Tarifa. It was named after a predatory chief, who took up his residence there more than a thousand years ago. Afterward the Moors built a strong castle at Tarifa, and compelled vessels passing through the Straits to stop and pay duties. Hence the word tariff, from Tarifa, the town where *black mail* was so long levied.

ABRAHAM LINCOLN'S MODE OF BUOYING VESSELS.

Patented May 22, 1849.

In discharging our accustomed round of duties at the Patent Office recently, our attention was called to a model of a patented mode of buoying vessels, the invention of no less a personage than a President of the United States.

We believe this is the first instance of an inventor receiving the highest honor which can be conferred by a republican people. We think other of our inventors may take courage and not despair of yet becoming Presidents. We presume the thought of becoming a President never entered Mr. Lincoln's thoughts at the time he was contriving his invention and seeking a patent.

The invention relates to an entirely novel mode of buoying steamboats over bars and shoal places in rivers. Buoyant chambers, constructed in the same manner as bellows, with the tops and bottoms of boards or metal plates, and the sides of india-rubber cloth or other flexible material, are secured at the sides of the vessel under the guards. Stiff rods pass through the tops of the chambers, and are secured rigidly to their bottom boards, so that, by pushing down these rods, the chambers are expanded, and by drawing the rods up, the chambers are folded snugly under the guards. For working the rods up and down, endless ropes are secured to them and passed several times around a central shaft which extends through the middle of the boat just below the upper deck, the ropes passing over rollers or sheaves secured to the lower side of the upper deck, and thence down by the sides of the rods, under sheaves secured to the lower deck, so that, by turning the shaft in one direction, the rods are forced down and the chambers expanded; while, by turning it in the other direction, rods are drawn up and the chambers are folded. The shaft is worked by the engine or hand power, which ever may be most convenient.

This invention illustrates forcibly the variety of talents possessed by men; it is probable that among our readers there are thousands of mechanics who would devise a better apparatus for buoying steamboats over bars, but how many of them would be able to compete successfully in the race for the Presidency?—*Scientific American.*

FIRST BLOOD OF THE REVOLUTION.

It is generally believed that on April 19, 1775, at Lexington, the first blood was shed, but Westminster, Vt., files a prior claim in favor of one William French, who was killed on the night of March 13, 1775, at the King's Court House, in what is now Westminster. At that time Vermont was a part of New York, and the King's court officers, together with a body of troops, was sent on to Westminster to hold the usual session of the court. The people, however, were exasperated, and assembled in the court house to resist. A little before midnight the troops of George III. advanced and fired indiscriminately upon the crowd, instantly

killing William French, whose head was pierced by a musket ball. He was buried in the churchyard, and a stone erected to his memory, with this quaint inscription:

"In memory of William French, Who Was Shot at Westminster, March ye 12th, 1775, by the hand of the Cruel Minesterial tools of George ye 3d at the Court-house at a 11 o'clock at Night, in the 23d year of his age

"Here William French his body lies.
For Murder his Blood for Vengeance Cries,
King George, the Third, his Tory crew
That with a ball his head Shot through,
For Liberty and his Country's Good
He lost his Life, his Dearest blood."

GOLD COIN.—HOW IT IS MADE.

Gold ordinarily comes into the mint in shape of dust, scales or bars, the first two coming from the placer or gravel mines, and the last usually from the quartz, having been melted and retorted at the mills. Each deposit is separately weighed and numbered by the receiving clerk, and is placed in an iron box by itself, accompanied by a tag indicating its number, and thereafter that deposit retains that number until it is ready for coinage, the name of the depositor only being known to the receiving clerk and the assayer. It is then sent to the melting room, in charge of the melter and refiner, where it is melted and run into a bar about the shape of a brick, and stamped with the number of the tag by which it was accompanied, and is returned to the receiving clerk to be weighed again, to ascertain what loss, if any, has occurred in the melting. Then it is sent to the sampling room, where a small piece about the size of a half dime, is cut from one corner of the top, and a like piece from the diagonal corner of the bottom, and the bar is then returned and locked up in the vault to await the report of the assayer upon the value of the deposit, which value is to be ascertained by assays from the pieces chipped from the bar as before indicated, and upon his report the depositor, if he so desires, is paid at once without awaiting the process of coining the metal deposited by him.

Deposits are received up to twelve o'clock noon, and all the deposits received are melted and chipped and the assays made during the day, each deposit being kept separate. The following day these several deposits are run into what are termed unparted bars, which are also chipped and assayed, and these bars are sent to the refinery.

Gold very rarely comes to the mint perfectly pure. It always contains more or less silver, and generally some iron or other base metal. It is parted or separated from these at the refinery, and the gold and silver contained in the bars sent from the mint to the refinery, is returned to the mint in the shape of fine gold and fine silver, supposed to be freed from all impurities. These bars are weighed and the gold bars are again chipped for assay in the same manner as the original deposit, and if found to be pure, the gold is alloyed with the necessary quantities of silver and copper to bring it to the coin standard—.900 gold, .005 silver, and .095 copper—and is melted and run into ingots. These ingots are also chipped and assayed, and if found to be of the exact standard of fineness, are sent to the coiners' department.

In the coiners' department the ingots are first rolled into strips about five feet in length and of the required width and thickness of the coin proposed to be made. They are then an-

nealed by being placed in copper tubes, probably fifteen or twenty strips in a tube, which is closed up and put into an oven and treated to a cherry red heat, and after being cooled they are taken out and run through a cutting machine which cuts out the shape and as near as possible the size of the required coin. The blanks, as they are called, are then taken to the adjusting rooms, where each piece is carefully weighed, and if found to be too heavy, enough is filed off the edges to bring it to the standard weight, and any that are found to be light are returned to be re-melted.

The adjusting room is connected with the coiners' department, and the adjusters are all women, the only females employed in the mint. There are from twenty to thirty of them. Their work is not heavy, but it requires some degree of skill and very great care.

After being properly adjusted the blanks are run through the milling machine which thickens the edges and makes it the proper size. They are then stamped by a press of immense power, a power equal to 175 tons weight being required and used to stamp each double eagle, the impression being made on both sides at the time. This is the last process, and the coin is then turned over to the Treasurer to be paid out as required.

HISTORY OF MATCHES.

The history of the match dates back nearly one hundred years, but the beginning of their practical use comes within the memory of many living men. In 1680, Godfrey Haucknitz, in London, applied phosphorus to the making of matches. He first rubbed it between folds of brown paper till it took fire, and it was then made to ignite a stick, one end of which had been dipped in sulphur. This was the earliest form of the common match, such as we use to-day, but the cost of phosphorus prevented its being very largely used for a long time. A very few matches, consisting of small sticks dipped first in sulphur and then in a composition of chlorate of potash, flowers of sulphur, gum or sugar, and cinnabar, which last colored them red, were sold in a little box for fifteen shillings, or nearly four dollars. Accompanying these in the box there was a little bottle of sulphuric acid, into which the match being dipped, it was instantly ignited by the chemical action induced between the acid and chlorate of potash. In 1828, Mr. John Walker, a chemist in England, introduced the lucifer match, which was lighted by drawing it rapidly over folded sandpaper. From this time on, the steps of improvement were many, and now we have nothing in our houses more useful, more convenient and more inexpensive than the match.

HOW GREENBACK PAPER IS MADE.

All the paper for money issued by the United States government is manufactured on a sixty-two inch Fondriner machine, at the Glen Mills, near West Chester, Pa. Short pieces of red silk are mixed with the pulp in the engine, and the finished stuff is conducted to the wire without passing through any screen which might retain the silk threads. By an arrangement above the wire cloth a shower of short pieces of fine blue silk thread is dropped in steaks upon the paper while it is boing formed. The upper side, on which the blue silk is dropped, is the one used for the face of

the notes, and from the manner in which the threads are applied, must show them more distinctly than the reverse side, although they are imbedded deeply enough to remain fixed. The mill is guarded by officials night and day to prevent the abstraction of any paper.

HISTORY OF ELECTRICITY.

The only electric fact known to the ancients is that referred to in the writings of Thales, 600, B. C., that amber when rubbed would attract light and dry bodies. The science of electricity dates properly from the year 1600, A. D., when Gilbert, of Colchester, published a book giving a list of substances which possessed the same properties as amber, and speculates on magnetic and electric forces. He is the inventor of the word electricity, which is derived from the Greek word, *electron*, amber. In 1672, Otto von Guericke, of Magdeburg, describes among his other inventions, the first electric machine ever made, which consisted of a globe of sulphur turned by a handle and rubbed by a cloth pressed against it by the hand. In 1709, Harksbee constructed a machine in which a glass cylinder rubbed by the dry hand replaced Guericke's sulphur globe. In 1729, Grey and Wehler were the first to transmit electricity from one point to another and to distinguish bodies into conductors and non-conductors. In 1733 Dufay showed the identity of electrics and non-conductors, and was the first to discover the two kinds of electricity and the principle which regulates their action. Up to this time the glass tube rubbed by a piece of cloth, which Gilbert first introduced was used in all experiments. Boze, a professor of Wittenberg, took the hint from Harksbee's machine and used a globe of glass for his machine, and furnished it with a pine conductor. Winkler, at Leipsic, first used a fixed cushion in the machine. In 1746 the Leyden jar was discovered, accidentally, at Leyden, by Muschenbrock. It is also claimed by Cumens, a rich Burgess of that town. In 1747, Franklin showed the electric conditions of the Leyden jar, and in the year 1752 proved the identity of lightning and electricity by his famous kite experiment. This was performed about the same time by Romas, of the town of Narac, in France. Franklin made the first lightning conductor in the year 1760. Ramsden, in 1768, was the first to construct a plate machine, and Noun, in 1780, a two fluid cylinder machine. The condenser was invented by Volta in 1782. Galvani, in 1786, made the discovery which led to the addition of the new branch of the science which bears his name.

THE ORIGIN AND HISTORY OF ELECTRIC TELEGRAPHY.

The first electric telegraph appears to have been made about the year 1786; though long before that time, the vague idea of a magical magnetic telegraph was entertained. Strada, a Jesuit priest, in a curious book, published in 1649, describes a fabled contrivance of two magnetic needles, attached to dials, bearing a circle of letters, and which possessed the property of always indicating the same letter; so that when one needle was made to point to any particular letter, the other needle, however distant at the time, placed itself so as to point to the same letter.

In 1774, George Louis Lesage, a philosopher of French origin at Geneva,

constructed an apparatus composed of twenty-four wires, corresponding to the twenty-four letters of the alphabet, and separated from each other by insulators. To the extremity of each one of these wires a pith-ball was suspended by a silk thread. By touching the wires with an electrical machine, the other extremity of the conductors — the pith-ball — would be repulsed, and thus make known the letter indicated.

In 1793, Claude Chappe, after much labor and research, established between Paris and Lille the first line of aerial telegraph; and this happy result established the success of the system.

Before this epoch, several philosophers proposed to employ electricity in the transmission of despatches, upon their knowledge of the phenomenon of static electricity, and from their having observed its prodigious rapidity.

The Electric Telegraph, like all great inventions, was not the work of a single mind. It has followed science in different developments, and could not have passed the domain of science into application, except the laws and principles of electricity were known — which inspired new efforts that were to be crowned by a complete success.

From 1780 to 1800, Reiser, of Germany, and Salva and Bethancourt, of Spain, tried some similar systems.

In 1800, the curious discoveries of Galvani conducted Volta to the discovery of electric currents and their chemical and physiological properties. A new era opened for the science, and permitted a substitute of permanent supply of electricity in place of the electrical machine and Leyden jar.

Dr. Coxe, an American, about the same time proposed a telegraph, the principle of which consisted in the decomposition of chemicals by the electric current.

Mr. Francis Ronalds, in 1816, constructed a telegraph, by which he was able to send signals with considerable facility and rapidity through a distance of eight miles. His plan was very simple. At either end of the wire was a clock carrying a light paper disc, on which were marked the letters of the alphabet, and certain words and numbers. By means of a perforated cover only one letter was seen at a time. As the clocks run together, of course the same letter would be visible at the same time; and if an electric discharge were sent from one station to another when a particular letter was exhibited on the dial, the observer at the other end would readily know the signal intended.

Harrison Gray Dyar, an American, constructed a telegraph, in 1828, at the race course on Long Island, and supported his wires by glass insulators fixed on trees and poles. By means of common electricity acting on litmus paper, he produced a red mark, and then passed the current through the ground as a return circuit. The difference of time between the sparks indicated different letters arranged in an arbitrary alphabet, and the paper was moved by the hand.

Owing to the use of frictional electricity, which is too easily dissipated and difficult of being confined to conductors, this telegraph could not have been of any practical use; although, had Mr. Dyar not been prevented, through fear of prosecution on a charge of conspiracy to send secret communication in advance of the mail, from prosecuting his discovery, he would, undoubtedly, have achieved great success, as his system possessed many of the principles and features of the Morse invention.

The discovery of the magnetization

of soft iron under the influence of currents of induction, is due to Arago and Faraday, but the development of the motor function of electricity, or of the means by which electro-magnetic power can be exerted at a distance, is due to the early experiments of the Secretary of the Smithsonian Institute, Professor Henry, whose discoveries in electro-magnetism, and especially of the quantity and intensity of the magnet, in 1830, laid the foundation for all subsequent forms of electro-magnetic telegraphs, and made succeeding steps comparatively easy.

The determination of laws upon the intensity of currents is due to Ohm and Pouillet, and the invention of the batteries which generate the currents belongs to Becquerel, Daniell, Bunsen, and Grove.

Among the philosophers who have occupied themselves with this question, we cite in order, up to the time when the system was perfected : Alexander of Edinburgh, M. le Baron Schilling, M. Vorselmann de Heer, MM. Gauss and Weber, M. Amyot, MM. Breguet and Masson, Sir Humphrey Davy, Professors Henry and Coxe, and Dr. Jackson.

MM. Gauss and Weber, in 1834, constructed a line of telegraph over the houses and steeples of Gottingen. The circuit contained about 15,000 feet of wire. They used galvanic electricity, and applied the phenomenon of magnetic induction discovered by Professor Faraday.

The slow oscillations of magnetic bars caused by the passage of currents, and observed through a glass, furnished the signals for corresponding. The operation was complicated, slow, and inefficient.

M. Steinheil established at Munich, and worked in 1837 an electric telegraph between two distant points. Up to this time the electric telegraph had been considered only as a curious theoretical science, without possible application, as, for the most part, the apparatus required separate wires for each letter or signal ; but it was not doubted, if the practical realization of the idea could be arrived at, that they could reduce this number to two, or even to one, by means of conventional combinations.

There remained, however, still an important question, which experience alone could solve,—whether it were possible to obtain upon a great length of wire sufficient insulation without too great expense. The great extension of the lines of railway in 1838, and the necessity felt for the means of rapid communication, hastened the solution of this question.

The first electric telegraph established in Europe for the actual transmission of dispatches between distant points, was between London and Birmingham, in 1838, by Prof. Wheatstone. Shortly after, lines were constructed by simply suspending the wires upon porcelain supports, when sufficient intensity was obtained to work the apparatus at a great distance.

The first line in France was constructed in 1844, between Paris and Rouen, along the line of the railway. The lines between Paris and Orleans, and Paris and Lille, were constructed in the years 1847 and 1848. Shortly after, lines were constructed along the several lines of railway throughout France.

The first line constructed in the United States was put in operation in the month of June, 1844, between Washington and Baltimore. The next year it was continued to New York and Boston. and in 1846 to Buffalo

and Harrisburg. The succeeding year a line was constructed between Buffalo and Montreal, and during the same season between Boston and Portland. The next year, 1848, found the entire country excited upon the subject of the telegraph, and lines were projected and constructed in every direction.

In 1837, Prof. S. F. B. Morse made known to the public his recording telegraph, which justly retains his name, and of which it appears that he had conceived the idea far back as 1832. Among about *sixty-two competitors to the discovery of the electric telegraph* up to 1838, Morse alone, in 1837, seemed to have reached the most perfect result desirable for public and practical use.

FIRST WEEK OF THE TELEGRAPH.

The telegraph was first put in operation between Washington and Baltimore, in the Spring of 1844, and was shown without charge until April 1, 1845. Congress, during the session of 1844–'45, made an appropriation of $8,000 to keep it in operation during the year, placing it, at the same time, under the supervision of the Postmaster General. He, at the close of the session, ordered a tariff of charges of one cent. for every four characters made by or through the telegraph, appointing as the operators of the line: Mr. Vail, for the Washington station, and Mr. H. J. Rodgers for Baltimore.

The receipts for April 1-3 inclusive, were as follows: The first day's receipts were 12½ cents; the second day's receipts were 60 cents; and the third day's, $1.05.

It should be borne in mind that Mr. Polk had just been inaugurated, and, as is always the case on the advent of a new administration, the city was filled with persons seeking for office. A gentleman of Virginia, who stated that to be his errand to the city, came to the office of the telegraph on the 1st day of April, and desired to see its operation. The oath of office being fresh in the mind of the operator, and he being determined to fulfill it to the letter, the gentleman was told of the rates of charges, and that he could see its operation by sending his name to Baltimore, and having it sent back, at the rate of four letters or figures for a cent; or he might ask Baltimore regarding the weather, etc. This he refused to do, and coaxed, argued, and threatened. He said there could be no harm in showing him its operation, as that was all he wanted. He was told of the oath just taken by the incumbent, and of his intention to serve it faithfully; and if it was shown to him by the passage of a communication gratuitously, it would be a violation of his oath of office. He stated he had no change. In reply, he was told that if he would call upon the Postmaster General and obtain his consent the operation should be shown him gratis, the operator would cheerfully comply to almost any extent. He stated, in reply, that he knew the Postmaster General, and had considerable influence with some officers of the government, and that he (the operator) had better show it to him at once, intimating that he might be subjected to some peril by refusing. He was told that no regard would be paid to the extent of his influence, etc., be it great or little; that he did not think he was at liberty to use the property of the government for individual benefit when under oath to exact pay; and cited the rules of the post office in relation to the carriage of letters; but he was willing to do as directed by the Postmaster Gen-

eral (Hon. Cave Johnson). The discussion lasted almost an hour, when the gentleman left the office in no pleasant mood.

This was the patronage received by the Washington office on the 1st, 2d and 3d of April. On the 4th, the same gentleman "turned up" again and repeated some of his former arguments. He was asked if he had seen the Postmaster General, and obtained his consent to his request; to which he replied he had not. After considerable discussion, which was rather amusing than vexatious, he said that he had nothing less than a twenty-dollar bill and one cent, all of which he pulled out of his breeches pocket. He was told that he could have a cent's worth of telegraphing, if that would answer, to which he agreed. After his many maneuvers, and his long agony, the gentleman was finally gratified in the following manner: Washington asked Baltimore, 4—which means, in the list of signals, "What time is it?" Baltimore replied, 1 — which meant, "1 o'clock." The amount of the operation was one character each way, making two in all, which, at the rate of four for a cent, would amount to half a cent exactly. He laid down his cent, but he was told that half a cent would suffice if he could produce the change. This he declined to do, and gave the whole cent, after which, being satisfied, he left the office.

Such was the income of the Washington office for the first four days of April, 1845. On the 5th, twelve and a half cents were received. The 6th was the Sabbath. On the 7th, the receipts ran up to sixty cents; on the 8th, to $1.32; on the 9th to $1.04. It is worthy of remark, concludes Mr. Vail, that more business was done by the merchants after the tariff was laid than when the service was gratuitous.

The above details may strike many as very trifling and undignified. So they are, in themselves; but therein consists their charm and their relevancy to the subject in hand. Deep in our nature there is a principle that loves to contrast small beginnings with grand results. History is full of this. Development is characteristic of the works of God, and of the works of man as well. Nothing great ever comes all of a sudden. To the ignorant and unobservant it may seem so, but it only seems, for it is not so. It was not thus with the commonest implement of the peasant — the plow, for instance. Only of late has this — the pioneer and the honored symbol of civilization — risen to its present advanced degree of improvement, for doubtless it has not yet reached perfection. So of every other in the service of man. The telegraph is but a particular instance of a general law — development. To note a single point in its germ-period was all that the writer proposed to do.

As a *finale* to this humble scrap of history, it would seem to be eminently fit to reproduce a relation made by Professor Morse, which will explain itself. It may be proper to add, however, that the date of the midnight passage of the Telegraph bill must have been in May, 1843, as the passage of the dispatch suggested by the lady friend of Mr. Morse was on Monday, May 27, 1844, which, he says, was about a year after the law was passed.

Says Professor Morse: "My bill has indeed passed the House of Representatives, and it was on the calendar of the Senate; but the evening of the last day had commenced, with more than one hundred bills to be consid-

ered and passed upon before mine could be reached.

"Wearied out with the anxiety of suspense, I consulted one of my senatorial friends. He thought the chance of reaching it to be so small that he advised me to consider it as lost. In a state of mind, gentlemen, which I must leave you to imagine, I returned to my lodgings to make preparations for returning home the next day. My funds were reduced to a fraction of a dollar. In the morning, as I was about to sit down to breakfast, the servant announced that a young lady desired to see me in the parlor. It was the daughter of my excellent friend and college class-mate, the Commissioner of Patents (Henry L. Ellsworth). She had called, she said, by her father's permission, and in the exuberance of her own joy, to announce to me the passage of my Telegraph bill, at midnight, but a moment before the Senate's adjournment!

"This was the turning point of the telegraph invention in America.

"As an appropriate acknowledgment for the young lady's sympathy and kindness — a sympathy which only a woman can feel and express — I promised that the first dispatch, by the first line of telegraph from Washington to Baltimore, should be indited by her. To which she replied: "Remember, now, I shall hold you to your word.'

"In about a year from that time the line was completed, and everything being prepared, I apprised my young friend of the fact. A note from her inclosed this dispatch:

'WHAT HATH GOD WROUGHT.'

"These were the first words that passed on the first completed line of electric wires in America. None could have been chosen more in accordance with my own feelings. It baptized the American Telegraph with the name of its author."— *Scientific American.*

ORIGIN OF THE ATLANTIC TELEGRAPH.

The origin of the Atlantic telegraph belongs exclusively to Gen. Horatio Hubbell, a distinguished member of the Philadelphia bar, who projected and originated the grand idea as early as 1848, and to his associate, J. H. Sherburne, who had the moral courage to join Gen. Hubbell in signing his memorial to Congress, detailing the plan, and asking governmental assistance in carrying it out.

This memorial is the *origin* of the Atlantic telegraph, and was presented to the Senate of the United States by the Vice President, Hon. G. M. Dallas, and to the House by J. R. Ingersoll, on the 29th of January, 1849. When first published, it was treated as a chimera of the wildest kind, and the memorialists, if not mad, as nearly so as possible. When presented in the Senate by Vice President Dallas, the greater part of that body were for throwing it under the table; but one Senator (says Mr. Dallas in a note to Gen. Hubbell, dated March 18, 1854), *Jefferson Davis,* moved that it be referred to the Committee on Commerce, remarking that "the world was not yet prepared for the project, but it might be soon." This memorial is recorded on the Senate journal of the day it was presented, and will speak for itself. The idea of establishing a transatlantic telegraph with Gen. Hubbell was not a vague and impulsive one, but was the result of long and patient study, investigation and inquiry of an original and practical mind, which, while it thoroughly com-

prehended the gigantic character of the undertaking, was yet alive to and singularly suggestive of the obstacles to be encountered and the means of overcoming them. In the memorial, the existence of the plateau or table land between Newfoundland and Ireland is first announced to the world as the course where the telegraphic communication would be established betwen the Old and New continents. The words of the memorial are explicit on this point, as will be seen by the following extract from it:

"Your memorialists proceed to say, that from many observations that have been made, there is incontestible evidence of the existence of a submarine table land, extending from the Banks of Newfoundland across the Atlantic Ocean to the mouth of the British Channel. This is proved by the altered color of the sea water, which has a different appearance in unfathomable places from what it has in shallow spots. This, combined with the volcanic construction of Iceland and the Azores, and the situation of that portion of the ocean that lies between both these volcanic groups, has led to the conclusion that there has been a lifting up of the bottom of the sea, through the agency of a Plutonic power, and that the bottom thus elevated appears to be cut through in many places by deep water channels. The appearance of *medusæ, polypi,* and other marine creatures seen upon the edge of the discolored water, strengthens this opinion."

They then proceed to ask that they be furnished with a vessel, in order to make the necessary surveys and soundings, and it was, no doubt, in accordance with this suggestion that Lieut. Berryman was dispatched, and did make his soundings over this part of the ocean in 1853. Lieut. Maury did not make a personal survey himself, but made a report upon the soundings of Lieut. Berryman, under date of 22d of February, 1854—five years after the Hubbell and Sherburne memorial had been presented to Congress and promulgated to the world.

From the foregoing indisputed documentary evidence now on file at Washington, it is plain that the scheme for a transatlantic telegraph had its origin in America, and that the mode, means, and location to carry the telegraph wire or cable across the Atlantic ocean were originated by Gen. Hubbell; that to him and to his deceased associate, Mr. Sherburne, who signed the memorial, is due the exclusive honor of first pointing out the existence of the plateau or table land between Newfoundland and Ireland, in connection with the telegraph cable now successfully laid upon it; and finally that these gentlemen were the first to publish and promulgate the feasibility of such an enterprise, and thus enlist in its behalf the attention, capital and skill of the individuals and governments, through whose agency the inceptive idea of the great mind in which it originated has been successfully carried out in accordance with the original suggestions contained in the Hubbell and Sherburne memorial.

NUMBER OF LETTERS IN DIFFERENT LANGUAGES.

The number of letters in the alphabet of different languages is as follows: English, 26; French, 25; German, 26; Spanish, 24; Dutch, 26; Greek, 24; Latin, 25; Slavonic, 27; Arabic, 28; Persian, 31; Turkish, 33; Georgian, 36; Hebrew, Chaldea, Syriac and Samaritan, each, 22; Coptic, 32; Sanscrit, 50; Bengalese, 21; Burmese, 19.

THE TRADE IN HUMAN HAIR.

The trade in human hair has become quite important during these latter years, especially, since it has been considered fashionable to replace by false hair, the deficiencies, real or supposed, of nature in this respect.

The origin of wigs is lost in antiquity; their use was abandoned during the middle ages, and was not renewed until the return of Saint Louis from the crusades, when he unfortunately became bald and was ordered by his physicians to keep his head constantly covered. Queen Blanche, his kind-hearted wife, inferring from this that it was hair that had kept her husband's head warm, obtained from all the surrounding courtiers a lock of their capillary appendages which she forthwith attached to the king's cap.

Ever since, Saint Louis has had the honor of being considered the patron saint of hair-dressers and wig-makers.

After this period wigs are not mentioned in history until the reign of King Louis XIV., who, in order to hide the unequal hight of his shoulders, wore a long wig which covered this defect. No man of quality in France was allowed to wear his own hair, and Binette, the king's wig-maker, became quite a celebrated personage who sold some specimens of his handicraft as high as one thousand dollars.

In 1674 the wig-makers as a body were duly incorporated, the members being allowed to carry side weapons; and they held the exclusive monopoly of the trade in human hair, which they retained until the revolutionary period, which swept all chartered privileges from the soil of France.

Notwithstanding many eminent professors of hygiene give reasons why the wearing of false hair is not healthy, and although it is also a well known fact that a portion of it has been cut from the bodies of the dead, still the habit of wearing other people's hair has never been discontinued since the time of Louis XIV.

Hair, to be really first quality, should be taken from the heads of the living, who have had much exposure to the air and who have never employed curling irons. The hair taken from the dead is mostly used in the preparation of watch chains, bracelets, and similar articles.

France monopolizes the largest share of the trade in human hair. Paris, Marseilles, Lyons, Caen, Guibray and Beaucaire, are the cities which do the largest part of this trade, the last three holding annual fairs for this specialty.

In Paris alone there are some thirty or forty dealers in hair, each of whom employs some three or four regular cutters. These, in their turn, have several agents or decoys, who visit the country, penetrating every village and hamlet through the land, where they try to induce the simple country girls to part with their hair for some trifling articles of barter, such as gaudy muslin handkerchiefs or false jewelry.

Some years back, one firm in Paris traded in this way during one season nearly one hundred thousand dollars of merchandise; but the present merchants are compelled to pay in money instead of gewgaws. The peasants having learned the value of their hair, refuse to be swindled.

The exports of human hair from France to the United States recently increased so rapidly that the supply proved inadequate to meet the requirements, and the price was doubled. Germany, Belgium, Poland and Russia have since joined to furnish us with our supplies.

Another reason for the high price paid for hair is the well-ascertained fact, that, as education spreads in France, the country girls refuse to sell their hair; one of the principal motives for which is, that many of the young Frenchmen who have been drafted into the imperial army, on their liberation from service and return home, are averse to marrying the short-cropped and disfigured sweethearts they find on their return from the garrison towns, where the ladies all wore long hair, waterfalls, or chignons.

Some years back, the hair-cutting agents managed to obtain a full supply from Normandy and Brittany alone; but they have now to travel over the whole of France, Italy and Sicily. The total annual crop of the globe is at present about one million of pounds.

The northern hair is fine and soft; the southern is best fitted for curling.

Two clippings are made annually, one in the spring of the year the other in the autumn, the latter being considered of inferior quality.

The collected hair is tied into separate coils and thrown loosely into sacks, and forwarded to the merchants who must purchase or refuse the whole lot, as they are not allowed the privilege of assorting. As the hair from different portions of the same head varies in length and quality, it has to be picked and sorted by being put through six or seven successive operations, the first of which is to clear it of nits, or the adherent eggs of lice, which are abundant in the hair of the women of Italy and Brittany.

Hair destined for curling or for ringlets is rolled on small wooden rollers about four inches long, covered with paper, tightly bound, boiled, and, lastly, dried in an oven at a moderate heat. The cost of hair nearly quadruples from the time it is cut until it gets into the hands of the retailer. He in his turns attaches a quite arbitrary higher price to the same, in accordance with the presumed fortune of his customers, or the difficulty he is supposed to have experienced in finding a particular tint suited to some special taste or to the complexion of countenance. His price may vary, for a head of hair, from two dollars to three hundred times that amount.

The art of dyeing the hair has reached such perfection in our day, that, excepting very fiery red, fair blondes and silvery white, which are difficult to imitate, all colors sell for identical prices.

Theatrical wigs having to be seen at a distance, are cheap, with the occasional exception of the private property of some particular star actor.

It is nearly useless to add that the cast-off coils, knots, chignons, fronts, curls, and wigs are collected, cleaned. carded, and serve over and over again, spread over paddings of horse hair, or some other material, to adorn the heads of our fashionable belles.

THE HEALTHFULNESS OF LEMONS.

When people feel the need of an acid, if they would leave vinegar alone and use lemons or apples, they would feel just as well satisfied and receive no injury. A suggestion may not come amiss as to a good plan, when lemons are cheap in the market. A person should then purchase several dozen at once, and prepare them for use in the warm, weak days of the Spring and Summer, when acids, especially citric and malic, or the acid of lemons, are so grateful and useful. Press your

hand on the lemon and roll it back and forth briskly on the table, to make it squeeze more easily; then press the juice into a bowl or tumbler — never into tin; strain out all the seeds, as they give a bad taste. Remove all the pulp from the peels, and boil in water — a pint for a dozen pulps — to extract the acid. A few minutes' boiling is enough; then strain the water with the juice of the lemons; put a pound of white sugar to a pint of the juice; boil ten minutes, bottle it, and your lemonade is ready. Put a tablespoonful or two of this lemon sirup in a glass of water, and you have a cooling, healthful drink.

HOW BRONZE STATUES ARE CAST.

Among the various branches of fine-art metal work, the casting of bronze statuary, a *chef-d'œuvre* of Elkington's establishment, possesses perhaps as many points of interest as any. A leading process of bronze casting is known, says the *Engineer*, as the *cire perdue*, or wax process. A structure of iron bars, forming the skeleton of the statue, sustains the core. This rough angular outline stands on a kind of platform, having a fire-hole beneath for the purpose of melting the wax when the statue is completed. A mixture of clay, pounded brick, and other material, capable of being easily worked when moist, and very solid when dry, is then used for building up the skeleton, so as to present the general contour of the figure, but less than the proposed statue by just the thickness of the metal to be employed. Over all this is placed an equal layer of wax, on which all the details are expressed by the sculptor. "When the work is satisfactory from every point of view, ascending rods of wax representing channels, by which air is to find exit on the metal entering the molds, are placed wherever required. Viewed in this state, the model and its accompaniments strongly suggest the venous and arterial system of the human body, as shown in anatomical works, with the difference that the wax rods are external to the model of the body, which is visible through the intervening mesh-work. The whole model and rods are then painted over with fine loam in a liquid state, the process being repeated until the crust is strong enough to sustain a thick loam plaster. It is then bound with iron hoops, and a fire is lighted beneath the platform. The outer coating of wax, exactly representing the metal to be cast, is melted out, and the mold is intensely heated until dry enough to receive the molten metal from a reverberatory furnace adjacent to the mold. Jets are made for the introduction of the metal, and the apertures left by the melting of the wax rods afford a ready mode of exit for the air. The plug of the furnace is withdrawn, the flowing metal fills the mold, and the statue is completed. This process is somewhat hazardous, seeing that any defect in the casting would completely destroy the long labor of the artist."

ANCIENT BOOKBINDING.

The old stamped leather bindings of the fifteenth and sixteenth centuries are often beautifully executed, and exceedingly interesting. Jean Grolier, Viscount d'Aguisi, one of the four treasurers of France, (born at Lyons 1479, died 1565), collected a magnificent library, and had the books splendidly bound. In 1675, his library was dispersed. Gascon, the celebrated binder of that time, was chiefly employed

by Grolier, but the designs are said to have been composed by himself in moments of leisure. A wood cut of one of these bindings will be found in Shaw's "Decorative Arts, Ecc. and Civil, of the Middle Ages." It had the usual inscription: "*Io Grolierii et amicorum*," indicating that it was for the use of his friends as well as himself. The collection of Mr. Edwards was very rich in these volumes, and large prices were realized. A colored plate of great beauty will be found in Shaw's work, of a book belonging to the same style and period, though it cannot be proved to have belonged to the Chevalier Jean Grolier. Aldus, the famous printer of Venice, printed the works of Machiavelli in 1540, in four volumes. Grolier had his copy bound in four different patterns, and one volume was sold at the Libri sale for one hundred and fifty pounds. At the same sale, two volumes, which formerly belonged to the library of Diana of Poitiers, beautifully bound, were sold for eighty and eighty-five pounds respectively. The celebrated artist, "le petit Bernard," is said to have been employed on them. At the library at Treves is a manuscript studded with heads wrought in fine cameos.

In the middle of the sixteenth century, leaves of paper were pasted together for bindings, wood having been previously used for the purpose. Mr. Thoms says the originator of binding in cloth was Mr. R. E. Lawson, of Stanhope street, Blackfriars, formerly in the employ of Mr. Charles Sully; and the first book bound in cloth was a manuscript volume of music, which was subsequently purchased by Mr. Alfred Herbert, the marine artist. On the volume being shown to the late Mr. Pickering, who was at the time (1823) printing a diamond edition of "the classics," he thought this material would be admirably adapted for the covers of the work. The cloth was purchased at the corner of Wilderness row, St. John's street, and five hundred copies of the Diamond Classics were covered by Mr. Lawson with cloth. Shakespeare's plays were also issued in this form, and these works were the first books bound in cloth.

The custom of chaining books to desks in churches is said to have originated from an act of Convocation in 1562, ordering that Nowell's Catechism, the Articles, and Bishop Jewell's Apology should be taught in universities and cathedral churches. But the custom has been traced back as far as Sir Thomas Lyttleton, who, by his will, dated 1481, ordered some of his works to be chained in different churches. St. Bernard, in 1153, in one of his sermons, actually alludes to some such custom.

It is probable that there was no specimen of velvet binding before the fourteenth century. In the will of Lady Fitzhugh, c. 1427, several books are bequeathed: "I wyl that my son Robert a Sautre covered with rede velvet, and my doghter Mariory a Primer cou'ed in rede, and my doghter Darcy a Sauter cou'ed in bleu, and my doghter Mal de Eure a Prim'r cou'ed in bleu." Queen Elizabeth had a little volume of prayers bound in solid gold suspended by a chain at her side. The Countess of Wilton in her "Art of Needlework," says the earliest specimen of needlework binding remaining in the British Museum is Fichetus (Guil.) Rhetoricum, Libri tres (Impr. in Membranis), 4to, Paris ad Sorbonæ, 1471. It is covered with crimson satin, on which is wrought with the needle a coat of arms, a lion rampant in gold thread in a blue field, with a transverse

badge in scarlet silk; the minor ornaments are all wrought in fine gold thread.

The next in date in the same collection is a description of the Holy Land, in French, written in Henry VII.'s time. It is bound in rich maroon velvet, with the royal arms, the garter, and motto embroidered in blue; the ground crimson; and the fleurs-de-lis, leopards, and letters of the motto in gold thread. A coronet of gold thread is inwrought with pearls, the roses at the corners are in red silk and gold. In the Bodleian Library is a volume of the Epistles of St. Paul (black letter), the binding of which is embroidered by Queen Elizabeth; around the borders are Latin sentences, etc. Archbishop Parker's De Antiquitate Britanicæ Ecclesiæ (1572), in the British Museum, is richly bound in green velvet, embroidered with animals and flowers, in green, crimson, lilac and yellow silk, and gold thread. In the same collection is a Bible bound for James II., showing on the cover his initials, J. R., surmounted by a crown, and surrounded with borders of laurel, the four corners being filled with cherubim.

The writer of this paper once saw at Broomfield, in Essex, a Bible which belonged to Charles I. (date 1527, Norton and Bell, printers). It is a folio, bound in purple velvet; the arms of England, richly embroidered in raised work on both sides, and on the fly-leaf is written: "This Bible was King Charles the First's; afterwards it was my grandfather's, Patrick Young, Esq., who was library keeper to his Majesty; now given to the church at Broomfield by me, Sarah Attwood, Aug. 4th, 1723." It is a relic little known.

Various kinds of insects, popularly called bookworms, do much injury to books. A mite (*acarus eruditus*) eats the paste that fastens the paper over the edges of the binding, and loosens it. The caterpillar of another little moth takes its station in damp old books, between the leaves, and there commits great ravages. The little boring wood beetle also attacks books, and will even pierce through several volumes. Mr. W. R. Tymms mentions an instance of twenty-seven folio volumes being perforated in a straight line by the same insect, in such a manner that by passing a cord through the perfectly round hole made by it, the twenty-seven volumes could be raised at once.

THE GREAT WALL IN CHINA.

The Chinese have been for the past two or three thousand years a wall-making people. It would bankrupt New York or Paris to build the walls of the city of Pekin. The great wall of China is the great wall of the world. It is forty feet high. The lower thirty feet is of hewn limestone or granite. Two modern carriages may pass each other on the summit. It has a parapet throughout its whole length, with convenient staircases, buttresses, and garrison-houses at every quarter of a mile, and it runs, not by cutting down hills and building up valleys, but over the uneven crest of the mountains and down through their gorges, a distance of a thousand miles. Admiral Rogers and W. H. Seward calculated that it would cost more now to build the great wall of China through its extent of one thousand miles, than it has cost to build fifty-five thousand miles of railroad in the United States. What a commentary it is upon the ephemeral range of

the human intellect to see this great utilitarian, so necessary and effective two thousand years ago, now not merely useless, but an incumbrance and obstruction.

A SAFETY LIGHT.

In Paris, the watchmen in all magazines where inflammable or explosive materials are stored, use, for purposes of illumination, a light provided according to the following method: Take an oblong vial of the cleanest glass; put into it a piece of phosphorus about the size of a pea, upon which pour some olive oil heated to the boiling point, filling the vial about one-third full, and then close the vial with a tight cork. To use it, remove the cork and allow the air to enter the vial, and then recork it. The whole empty space in the bottle will then become luminous, and the light obtained will be equal to that of a lamp. As soon as the light grows weak, its power can be increased by opening the vial and allowing a fresh supply of air to enter. In winter it is sometimes necessary to heat the vial between the hands to increase the fluidity of the oil. Thus prepared, the vial may be used for six months.

SALTPETER AND ITS USES.

This well-known salt — which is also called nitrate of potassa and nitre — is determined by analysis to be composed of a mixture of nitric acid and potassa, and is found in a natural state in many parts of India, Egypt, Italy, America, and other countries. It is frequently found on walls sheltered from rain, and is artificially produced by lixiviation from the earths at the bottom of cellars, stables, &c.

The earths containing this salt are called nitre beds, and when the product is of good quality it possesses considerable antiseptic properties. That which is of the best quality and well refined, is obtained in long transparent crystals. It flashes up when thrown upon burning coals, and forms the principal ingredient in the manufacture of gunpowder, besides being extensively used in connection with several of the arts. It is also used as a medicine; has a sharp, acrid, bitterish taste, but cooling; and is employed to some extent in the preservation of meats and animal fibers. The genuine saltpeter is very brittle, but it is not altered by exposure to the air. Its specific gravity is 1.933.

In the manufacture of gunpowder the composition (if the substance is of good quality) is seventy-six parts of nitre, fifteen of charcoal, and nine of sulphur, first reduced to a fine powder separately, then mixed intimately, and subsequently formed into a thick paste with water. It is afterward dried, sifted and glazed.

Nitric acid, commonly called *acqua-fortis*, is prepared by a mixture of saltpeter with the oil of vitriol; the proportions best adapted for this purpose being three parts by weight of nitre and two of oil of vitriol, or one hundred of nitre and sixty oil of vitriol, previously diluted with twenty of water. Either of these proportions will produce an excellent acid, and one of the most useful known in chemical science.

When the mixture is submitted to distillation, it should be placed in glass or earthen vessels. The nitric acid passes out in the form of vapor, leaving behind in the retort bisulphate of potassa.

In pharmacy and surgery, nitric acid is extensively used, especially for de-

stroying contageous effluvia. Its color is a dark orange red, being highly corrosive. It gives off copious fumes and has a specific gravity of 150. It is largely employed for etching on copper plates, for engraving, for separating silver from gold, etc., etc. By a second distillation nitric acid may be obtained perfectly colorless.

The historian, Beckmann, asserts that the ancients were unacquainted with the properties of saltpeter, which seems somewhat improbable in view of the considerable quantities found in Egypt. The same authority claims that the *nitrum* of the Egyptians was really an alkaline salt. He, however, concurs in the opinion of others who believe that gunpowder was invented in India or China, and brought by the Saracens into Europe. The consumption of saltpeter for warlike purposes is very great, and during actual hostilities of long duration its price is liable to frequent and extreme fluctuations.

HISTORY OF WATER PUMPS.

Prof. Ruhlmann has published a long article in a Hanover journal on the invention and history of water pumps. He concludes that the pump of to-day is a Grecian invention, and was probably made during the reign of Ptolemies, Philadelphos and Euergetes, 283 to 221, B. C. The name, which is very similar in all languages, is derived from the Greek word *pempo,* to send or throw. The most ancient description that we have of a water pump is by Hero of Alexandre. There is no authentic account of the general use of the pump in Germany previous to the beginning of the sixteenth century. About the same time the endless chain and bucket works for raising water from mines began to be replaced by pumps. In the seventeenth century rotating pumps, like the Pappenheim engine with two pistons and the Prince Rupert's pump with one piston, were known in Germany. The pumps with plunger pistons were invented in 1674 by an Englishman named Morland, and the double acting pump by a French academician, de a Hire.

PRECAUTIONARY.

Keep all doors and windows of the structure closed until the firemen come; put a wet cloth over the mouth and get down on all fours in a smoky room; open the upper part of the window to get out the smoke; if in a theatre, keep cool; descend ladders with a regular step, to prevent vibration. If kerosene just purchased can be made to burn in a saucer by igniting with a match, throw it away. Put wire work over gas lights in show windows; sprinkle sand instead of saw-dust on floors of oil stores; keep shavings and kindling wood away from steam boilers, and greasy rags from lofts, cup-boards, boxes, etc.; see that all stove pipes enter well in the chimney, and that all lights and fires are out before retiring or leaving places of business; keep matches in metal or earthen vessels, and out of the reach of children; and provide a piece of stout rope, long enough to reach the ground, in every chamber. Neither admit any one, if the house be on fire, except police, firemen, or known neighbors; nor swing lighted gas brackets against the wall; nor leave small children in a room where there are matches or an open fire; nor deposit ashes in a wooden box or on the floor; nor use a light in examining the gas metre. Never leave clothes near the fire to dry; nor smoke or read in bed

by candle or lamp light; nor put kindling wood to dry on top of the stove; nor take a light into a closet; nor pour out liquor near an open light; nor keep burning or other inflammable fluids in a room where there is a fire; nor allow smoking about barn or warehouse.—*Dr. Hall.*

CHARCOAL.

Charcoal surpasses all other substances in the power which it possesses of condensing ammonia within its pores, particularly when it has been previously heated to redness. It absorbs ninety times its volume of ammonical gas, which may be again seprated by moistening it with water. It is by virtue of this power that the roots of plants are supplied in charcoal exactly as in humus, with an atmosphere of carbonic acid and air, which is renewed as quickly as it is abstracted. Charcoal has a physical as well as a chemical effect on soils, which is decidly useful. It renders them, as far as it is present, light and friable, and gives additional warmth to them by its color, and retains readily the rays of the sun during the day. Wherever charcoal has been applied, rust never affects the growth of wheat.—*Liebig.*

FEMALE SAILORS.

It is no new thing for women to become sailors. We are informed in ancient history that Artemesia, Queen of Halicarnassus, commanded five ships at the defeat of the Persians at Salamis, and made brave resistance, distinguishing herself by undaunted courage and ability, and a perfect knowledge of strategy.

Toward the end of the battle, seeing herself in great danger of being taken, she lowered her flag and attacked a Persian war-vessel with terrible fury. Her strategem had the desired effect, for her conquerors, believing her vessel to be one of their own, failed to pursue her. There are several instances on record of American women, wives of deceased captains, navigating their vessels into port after the death of their husbands.

In the reign of George III. of Great Britian, an Irish woman named Hannah Whitney served for five years in the Royal British Navy, and kept her secret so well that she was not known to be a woman until she retired from the service. A few years later a young Yorkshire girl walked from Hull to London in search of her lover. She found him enlisted on His Majesty's man-of-war Oxford, and thereupon she donned a sailor's suit, assumed the name of Charlie Waddell, and enlisted on the same ship. Her lover, not being as faithful to her as she to him, deserted the ship, and in attempting to follow his example, she was arrested and her sex detected. The officers raised a contribution for her, and she was dismissed and sent home.

In 1872, a Mrs. Cola became somewhat famous by serving on board a man-of-war as a common sailor. She afterward resumed her proper attire, and opened a coffee-house for sailors. In 1800 a girl of fifteen tried to ship at London on board a South Sea whaler, and being refused she put on boy's clothes and hired herself to a waterman, and became very skillful in rowing. She did not learn to swim, however, and one day, the boat capsizing, she was nearly drowned. In the crisis her sex was discovered, and she ceased to be "a jolly young waterman," and became a domestic servant in her own apparel.

Another girl, aged fourteen, named Elizabeth Bowden, being left an orphan, went up to London in 1807, from a village in Cornwall, in search of employment. She did not succeed in finding such work as she desired, and, putting on male attire, she walked to Falmouth, and there enlisted as a "boy" on board His Majesty's ship-of-war Hazard and did good service aloft and below. Her sex was finally discovered, however, and by the kindness of the officers the poor girl was placed in a proper position. Still another, named Rebecca Ann Johnson, had a cruel father who dressed her as a boy when she was thirteen years old, and apprenticed her to a collier ship, on which she served four years, and then left the service because a brutal mate gave her a severe beating for being slow when called on watch.

In 1815, when the British war vessel Queen Charlotte was paid off, a negro woman was found among the crew, who had served eleven years at sea under the name of William Brown, and had become so expert a sailor that she was promoted to be a captain of the foretop. She had all the peculiarities of a good sailor, and had kept her secret so well that no one suspected her real sex. This woman had been married, and had adopted a sailor's life to escape the abuse of a cruel husband.

THE CULTIVATION OF FLOWERS.

In addition to the pleasure that may be derived from floriculture, the sanitary value of flowers and plants is a feature of the subject so important as to call for special mention. It was known many years ago that ozone is one of the forms in which oxygen exists in the air, and that it possesses extraordinary powers as an oxidant, disinfectant, and deodorizer. Now, one of the most important of late discoveries in chemistry is that made by Prof. Montogazza, of Pavia, to the effect that ozone is generated in immense quantities by all plants and flowers possessing green leaves and aromatic odors. Hyacinths, mignonnette, heliotrope, lemons, mint, lavender, narcissus, cherry-laurel, and the like, all throw off ozone largely on exposure to the sun's rays; and so powerful is this great atmospheric purifier, that it is the belief of chemists that whole districts can be redeemed from the deadly malaria which infests them by simply covering them with aromatic vegetation. The bearing of this upon flower culture in our large cities is also very important. Experiments have proved that the air of a city contains less ozone than that of the surrounding country, the thickly inhabited parts of cities less than the more sparsely built, or than the parks and open squares. Plants and flowers and green trees can alone restore the balance; so that every little flower pot is not merely a thing of beauty while it lasts, but has a direct and beneficial influence upon the health of the neighborhood in which it is found.—

CAMEL-HAIR SHAWLS.

The material of which the shawls are made is wool called touz, procured from a goat of a particular species, frequenting the valley of Cashmere and the neighboring mountains of Thibet.

The fur of this goat is of two sorts: the touz, which is a soft woolly undercoat of grayish hair, and an outer coat of long, silken hairs. To make a shawl a yard and a half square requires the touz of ten goats.

The Hindoos have no large factories. The shawls are made by peasants, who divide their time between the field and the work-shop. The abode of the manufacturer of these magnificent productions is a small plot of ground, into which he puts four sticks, fastens them with cross-beams, constructs walls of wicker work, and forms the roof with leaves of palm trees; he then installs himself in his hut, with his family and tools, the latter of which are few and of the simplest description. The Hindoo knows nothing of the mechanical contrivances to aid him in his work. He first winds his thread on a distaff, erects an oblong frame, and then commences his work with a large wooden needle, very much in the same manner as the workmen in the famous French factory of Gobelins so well known to all continental travelers. His manner of working, as may be imagined, is extremely slow; but it is owing to this that the India shawls are so much superior to those manufactured in Europe, where machinery is employed instead of the hand.

The Hindoo weaver requires eighteen months to make a long shawl. The different parts of it are afterward sewn together with great skill. When busily, engaged the artisan can earn at the utmost four annas, or eight cents of our money, per day.

There are not more than four importers of these shawls in New York, and the entire trade of the country in these articles is in their hands, the cost of the goods putting it beyond the power of country dealers to carry an assorted stock. The price of shawls ranges from $400 to $3,000, and, therefore, to keep large assortments and to hold stocks of varied patterns and different make, requires the investment of large sums, which only the mammoth houses of that city can afford to make. The force of this statement will be admitted when it is known that the present stock of one Broadway establishment is estimated at $600,000. India shawls are named Dacca, Delhi, Bombay, Calcutta, Umritzer, etc., after the districts in which they were made. The labor, however, is what chiefly determines the value of a shawl, even when the texture is not the finest. The retail trade begins with the coming of autumn and lasts until late in the winter.

CASHMERE SHAWLS.

Finest of all woolen textures and most exquisite in workmanship, is the Indian shawl. Uniting richness of design with freshness of coloring, it has no rival in the world. It is not only the most splendid tissue ever wrought by the hand of man, but it is also the most solid and durable, whether it adorns the shoulders of a modern belle or the waist of an Eastern potentate.

The Vale of Cashmere, where roses ever bloom, is the seat of this manufacture. The Cashmere shawl is woven by hand from the finest wool grown in Thibet. The wool is first spun and then dyed. It is then woven in segments, which are afterward joined so skillfully as to leave no trace of the seam visible. The flowers are then worked in by hand, after which the shawl is cleaned and covered with a strong size, made principally of rice, when it is ready for the market.

Shawls were formerly made in pairs, but since European dealers have invaded Cashmere, more than two are made from the same pattern.

If destined for Europe, the shawl has to be disencumbered of its provisional

dressing. For this purpose it is washed in the river flowing from the Lake of Cashmere, whose waters are reputed to preserve the colors, a property attributed to the aromatic plants growing on its banks. A sheet of paper is laid between each fold of the shawl. It is enclosed in four or five envelopes, and packed with the utmost precaution.

So delicate and complicated a work can only be accomplished by workmen versed in it from infancy, and who, living upon a handful of rice, are satisfied with moderate wages.

The best workmen scarcely earn more than from three to four cents a day. The low price of labor will always render Europe tributary to Asia for this luxurious production. A shawl which costs $400 at Cashmere, or at Umritsur, in the Punjaub, where these shawls are also fabricated, could not be made for less than $5,000 to $6,500 by European workmen. The material only enters into twenty per cent. of the cost. Hence many French manufacturers have formed establishments at Cashmere and Umritsur, where shawls are made by native workmen; but in two many instances they have introduced their own designs, which have changed the national character of the shawl, and often in these cases the beautiful tissue is concealed beneath a mass of embroidery.

Shawls of inferior quality are also made at Loodiana, where this industry was introduced by a colony from Cashmere, recruited every year from the valley. The colors of those made at Loodiana are very solid, and bear constant washing. They are wanting in brilliancy of tints, consisting principally of brown, black, dark bottle-green, and indigo blue. The colors most prized are a dull yellow, shades of amaranth, and, most brilliant of all, a kind of rose pomegranate of the finest thread, used only in shawls of the finest quality. The favorite color in India is a bright copper green; it fades, but is very brilliant and costly, and is chiefly employed where palms are introduced into the design. Another shade of the same color is used for the warp of the finest shawls, as is also turquoise blue, a most costly color.

At Loodiana the workmen are seated three together at the same strip, in front of a cylinder upon which the warp is rolled. Each has at least fifty shuttles. The chief sits in the middle and guides the other two. In one pair of shawls is six hundred days' work; they would cost at Loodiana, if of the finest quality made, about $100. The white shawls with green palms are the coarsest.

These Loodiana shawls are heavy, the palms stiff and ungraceful, and they are destitute of the softness so admired in Europe; of this they gain in a great degree by wear and washing. From their cheapness Cashmere cannot contend with Loodiana in the Indian market. What the Indian produces by years of manual labor, the European now obtains in a short time by means of machinery. Shawls are made in the Jacquard loom by workmanship, the most intricate and complicated.

An attempt has been made to imitate these shawls in France, but the perfect softness of the Indian shawl has never yet been equalled.

Another great merit of the Indian *cachemire* consists in the harmony and effect produced from the proper distribution of color and the rich invention of their patterns; these give them an evident superiority over the French shawls, which last are chiefly distinguished by their well chosen designs and the perfect regularity of their weaving, equally apparent both in the

ground and border. The Cashmere wool is the most delicate and difficult of all tissues to work, so that the Eastern natives, by their success in weaving it, have earned the reputation of being the most patient and skillful weavers in the world.

INTRODUCTION OF CARPETS.

Carpets were in use, at least of some kind, as early as the days of Amos, about 800 B. C. They were spread on the ground, on which persons sat who dwelt in tents; but when first used in houses, even in the East, we have no record. In the twelfth century, carpets were articles of luxury; and in England it is mentioned as an instance of Becket's splendid style of living, that his sumptuous apartments were every day in winter strown with clean hay or straw, about A. D., 1160. The manufacture of woolen carpets was introduced into France from Persia in the reign of Henry IV., between 1589 and 1610. Some artisans, who had quitted France in disgust, came to England and established the carpet manufacture, about 1750. With us, as with most nations, Persia and Turkey carpets, the former especially, are most prized. The famous Axminster, Wilton and Kidderminster manufacture is the growth of the last hundred years. The weaver's engine (often called the Dutch loom) was brought into use in London from Holland in or about the year 1676; since then the general principle of the loom has been infinitely varied by mechanical ingenuity. There are about 250,000 hand looms in Great Britain, and 75,000 power looms, each being equal to three hand looms, making twenty-two yards each per day. The steam loom was introduced in the year 1807.

A HISTORY OF CARPETS IN AMERICA.

It is traditionally reported that the first carpet ever used in a private house in the United States, was one found in that of Captain William Kidd, the famous pirate, who was executed in 1701. This was probably some small Eastern rug which he had taken from some of his prizes. From files of the New York papers of the year 1760, advertisements have been culled showing that Scotch and other carpets were offered for sale there by merchants engaged in importing from the mother country. Yet until after the revolution their use was very limited. The rag carpet of strictly domestic make, and the sanded floor, satisfied the demands for comfort or fashion made by the mothers of the republic. The production, however, of rag carpets had become considerable in order to prepare the way for the establishment, in 1761, of a carpet factory in Philadelphia, by William Peter Sprague. Mr. Sprague called the products of his factory Turkey and Axminster carpets, and wove one of them, in which the design was the arms of the United States, with figures emblematic of its achievements.

In his report as Secretary of the American Treasury, Alexander Hamilton, in 1791, recommended that the duty of five per cent. upon imported carpets should be increased by 2½ per cent., as a further protection to this branch of industry. The census of 1810 returned 9,084 yards of carpetings and coverlets as the amount of that year's production in the United States. Of this, 7,500 yards were made in Philadelphia.

Up to this time, however, the weaving of carpets both in this country and England had been done entirely by hand. American invention had

been turned in the direction of improving the looms in ordinary use, and before 1840 several patents had been granted for looms to weave carpets, but even then only carpets of the simplest kind. The problem of making the power loom which should automatically perform so apparently difficult a task as to weave a two-ply web, so as to produce any required pattern, had, in England, been abandoned as insolvable.

It was, however, solved by Mr. Erastus Bigelow, of Massachusetts, who also invented a loom for the manufacture of Brussels carpets. His improved loom, by which figures were produced, which would match, was patented in 1845.

The exclusive right of using these looms in Great Britain was purchased by Messrs. Francis, John Joseph Crossley, Halifax, for ten thousand pounds. At first they met with considerable difficulty in finding men to work them, and it is said they only eventually succeeded by taking off their coats, tucking up their sleeves and going to work themselves.

OIL CLOTH CARPET.

Perhaps no subject has taxed in a greater degree the ingenuity of the inventor, the imagination of the artist, or the skill of the manufacturer, than floor coverings. Turn where we will, on every side, in the Old World or the New, we see at our feet ample evidence of the truth of this assertion. Whether in the magnificent cathedrals, the gorgeous palaces, or the busy exchanges of the Old World, or in the grandiose hotels, the stately mansions, or the more unpretentious villas of the New World, we find everywhere abundant evidence of what art and luxury have expended in the production of floor coverings.

In the old Roman and Grecian tiles, the later Pompeian and Renaissance, and the more modern Minton tiles, artistic excellence and manufacturing skill are alike admirable.

In Indian and Persian carpets, those of France, Aubusson and Moquette, or the Wilton, Brussels, Axminster, and tapestries of England, not forgetting those later efforts of our own manufacturers, color, texture and elegant design unite in the production of the more luxurious of all floor coverings.

Floor oil-cloths, although of more recent introduction than either of the foregoing coverings for floors, are, for utility, and frequently for elegance of design, worthy competitors for public favor.

Singular and interesting is frequently the origin and growth of new manufactures, and in none more so than in that of floor oil cloth. Somewhere about one hundred years ago, it was the fashion, indeed, rather a fixed custom, for the householder of "merrie England" to have the floor of the entrance hall of his house, which was ordinarily of wood, painted in large squares, in imitation of black and white tiles, such as are now used in our hotels, restaurants and drug stores.

An ingenious painter finding this an irksome business, alike tedious for himself and vexatious to his customers, conceived the idea of painting this tile pattern by hand on a piece of canvas at his workshop, and, when dry, laying it on the floor of the house, thus avoiding a loss of time and the unavoidable smell of paint experienced in the ordinary method. Having got thus far, this ingenious craftsman borrowed a set of calico printers' blocks, and attempted to print therewith, but these

he soon found to be too delicate for the production of the effects desired, and he proceeded at once to have blocks made better fitted to his purpose.

At first the design was crude and meaningless, but as success brought profit, artists of merit were employed in this manufacture, and by slow degrees an art manufacture of no ordinary merit was created.

The progress of any new manufacture is necessarily slow, and attended with many difficulties; and it was many years before the manufacture of floor oil-cloth obtained anything like its present excellence.

Special kinds of canvas had to be woven, and looms designed by the manufacturer capable of weaving wider widths than was previously deemed possible; eight yards wide cloth being at that time unknown as any article of commerce.

The oil-cloth manufacturer stretches this wide fabric in a wood frame by means of tenter hooks, or it is sometimes nailed, and it is then, as a preliminary step to painting, brushed over with weak size to stiffen it, and afterwards, when dry, it is rubbed with pumice-stone (which is previously wetted) to remove any knots or inequalities of surface. The paint, which is made much thicker than is used for painting wood-work, &c., is then applied with a trowel, such as is used by plasterers, until all the interstices of the fabric are filled, and an even surface obtained. Several applications are required for this purpose, and each coat must be dried by heat, before the next one is put on. Both sides of the cloth are treated in this way, and then a final coat of thin paint is brushed on the side on which it is intended to print the pattern.

The printing is still done by hand for floor cloths of eight yards wide, but an instrument or apparatus called a guage is most frequently used to obtain greater accuracy. These guages are variously made, but consist mainly in a long parallel bar extending the entire width of the table on which the cloth is laid during printing; and on this bar are indentations receiving corresponding projections or adjustments on the printing blocks. It is found in practice that this assistance enables an unskilled workman to print with greater accuracy than a skilled one could do without it.

In printing narrow width floor-cloth, machinery has been used for some years, with a great saving of time and labor.

A great revolution has taken place during the last few years in the treatment of oil-cloths after printing. At one time it was claimed as a great merit by the manufacturer, that his goods were seasoned without heat, and that he sold nothing under twelve months old. Some innovator having been bold enough, commenced to dry his goods by a moderate heat, with marked success; and in point of economy and time, the result has been that almost every manufacturer in America and Europe now does the same; but in place of a moderate heat being employed which was a decided advantage over no heat at all, a temperature of 140 to 150 degrees of Fahrenheit is frequently employed. This excess of heat is not good, and the public have therefore frequently to deplore the short durability of their floor oil-cloth.

TO REMOVE A GLASS STOPPER.

Take a cloth wet with warm water, and place around the neck of the bottle. The heat will expand the neck, and the stopper is easily removed.

HISTORY OF HATS AND HATTING.

The word hat is of Saxon derivation, being the name of a well-known piece of dress worn upon the head by both sexes, but principally by the men, as a covering from the hot sun of summer, the cold of winter, a defense from the blows of battle, or for fashion. Being the most conspicuous article of dress, and surmounting all the rest, it has often been ornamented with showy plumes and jewels, and with bands of gold, silver, etc. It is generally distinguished from a cap by its having a brim, which a cap has not, although there are exceptions even to this rule of distinction, for there are hats that have no brims, and there are also caps that are provided with a margin. Those hats that are made of fur or wool have all been felted, and felt, strictly speaking, is a fabric manufactured by matting the fibres together, without the preliminary operation of either spinning or of weaving.

We find but little of hat-making recorded in history, and anything relating to hats is extremely meager, although their partial use may be traced back to the time of ancient Greece amongst the Dorian tribes, probably as early as the age of Homer, when they were worn, although only by the better class of citizens when on a distant journey. The same custom prevailed among the Athenians, as is evident from some of the equestrian figures in the Elgin marbles.

The Romans used a bonnet or cap at their sacrifices and festivals, but on a journey the hat with a brim was adopted. In the middle ages the bonnet or cap with a front was in use among the laity, while the ecclesiastics wore hoods or cowls.

Pope Innocent, in the thirteenth century, allowed the cardinals the use of scarlet hats, and about the year 1440, the use of hats by persons on a journey appears to have been introduced into France, and soon after became common in that country, whence probably it spread to the other European States.

When Charles VII. of France made his triumphant entry into Rouen in 1440, he wore a felted hat.

Hatters of the present day most generously ascribe the honor of the invention of felting, and of its prospective introduction to that of hat-making, to the old renowned Monk St. Clement, who when marching at the head of his pilgrim army, obtained some sheep's wool to put between the soles of his feet and the sandals that he wore, which of course became matted into a solid piece. The old gentleman, philosophizing upon this circumstance, promulgated the idea of its future usefulness, and thus it is said arose the systematic art of felting and of hat-making.

However all this may be, still the invention of felted fabrics for the use of man may have been, as some assert, very ancient and of quite uncertain origin. The simplicity of its make, as compared with that of woven cloth, shows all speculative assertions to be rather uncertain.

However obscure the origin may be, we learn that the first authentic account of hatters appeared in the middle ages, in Nuremburg in 1360, in France in 1380, in Bavaria in 1401, and in London in 1510.

The hatting trade of the United States of America is noticed first in the representations made by the London Board of Trade to the House of Commons, in the year 1732, in which they refer to the complaints of the

London hatters, regarding the extent to which their particular manufacture was being carried at that time in New York and in many of the New England States.

A look at the fashions and mode of dressing in ancient times causes amusement. So capricious is the fancy of man that nothing is immutable, all is change, and hats have been of all conceivable shapes and colors, and dressed with the most fanciful decorations, plumes, jewels, silk-loops, rosettes, badges, gold and silver bands and loops, etc., etc.

The crowns and brims having been in all possible styles from the earliest period, it would appear that nothing is left for the present and all coming time but the revival of what has already been, even to the fantastical peaked crown, that rose half a yard above the wearer's head.

In the fifteenth century, hats in Great Britian were called vanities, and were imported, costing twenty, thirty and forty English shillings apiece, which were large sums of money at that early period.

The most extreme broad brims were worn about the year 1700, shortly after which the three-cornered cocked hat came in, and about this time feathers ceased to be worn, the lingering remains being left for the badge of servitude to the gentleman's attendant. Metal bands and loops were only regarded as proper for naval and military men of honor.

It is a singular historical fact that the elegant soft hat of the Spaniard has remained the same from the earliest period to the present day, while among all other civilized nations a transformation in the style of that article has taken place. Comfort in the wear seems to have given place at all times to fancy and the demands of fashion.

Queen Elizabeth's patent grant to the hatters of London is still recognized in England, and the 23d of November is the hatters' annual festival, that being St. Clement's day, the patron of the trade.

THE MANUFACTURE OF FINE FELT HATS.

BY JOHN B. STETSON, PHILADELPHIA.

To take the establishment in detail, we first visit the basement where is stored in original packages the first requisite, Fur, the majority of which is imported and is composed of several varieties and qualities. Commencing with the Russia Hare's Fur, taken from small animals, similar in appearance to the rabbit, which are reared for their furs, domesticated and protected by law in Russia. The skins are first shipped to Leipsic, that being the great market for them, and exposed for sale at the fairs held there for that purpose, being sent there from different sections of the country, where they find a ready sale from fur dealers from all parts of the globe. To prepare the Fur for hatter's purposes, it is removed with a sharp knife before being exposed for sale. Previous to the shaving operation the fur is what is called carrotted with the application of quicksilver, to give it its *felting* properties; without this process it would be useless, as it would not felt. For final preparation it is sent to Frankfort-on-the-Main, where the fleeces are carefully selected, dried and packed for transportation.

English Coney is also much used. The fleeces of this are all taken from the back of the animal. In the other varieties include the fur from all parts

of the body; and on all land animals that from the back is the thickest and longest, which makes the English preferable on that account. French Coney is also used to a great extent, but it is slightly inferior to both the Russian and English. But that from which the finest and best hats are made is the Rocky Mountain Beaver, superior to all others on account of its fine texture and long fibre; it brings in price about six dollars per pound currency. The South American Nutria is another fur greatly used, and is superior to all others except the beaver. Some idea of the number of animals slaughtered to provide material for hats may be formed when the skins of one hundred Coneys make only four pounds of marketable fur.

The preparation of this fur is the next operation, for when it is received from the importer it is necessary to thoroughly cleanse it, which operation is performed by a machine called a "picker." After which it is weighed off in such a number of ounces as may be required to produce the shape and size of hats desired by the manufacturer. It is then ready for the Forming Machine.

When the amount of fur for a hat has been deposited on the cylinder a damp cloth is thrown over it, on top of this is quickly placed a tin extinguisher perforated with small holes to permit the escape of the air; next an attendant seizes and plunges it into a vat of boiling water; by this operation the hat has assumed a conical, sugar-loaf shape about twice the dimensions of an ordinary hat.

The vat of boiling water is called by the workmen a battery, a copper or lead, tub-formed, octagon-shaped kettle, around which eight men work. The fur bodies are immersed in this hot bath a great number of times, till they have shrunken to ordinary dimensions, when they are taken to the drying room. In the large room set apart for the batteries we found nine plank kettles, and around which seventy-two men were at work. The kettles are partially filled with water, a coil of perforated pipe in the center of each connecting with the boiler to heat the water by steam. This is a great and economical improvement on the old style, where the water was heated by a separate furnace under each kettle, one of these furnaces consuming almost as much coal as it now takes to run the machinery of the whole establishment.

We next visit the Drying Rooms, two in number, and said to be the most complete in the country. To become thoroughly dry the hats remain here about twelve hours. They are then passed to the Shaving Machine, which is a marvel of ingenuity, and the only one, we believe, in the city which does the work of three or four men. This operation is to shave off the surplus hair that has worked itself through the fur on the surface. They are then second sized, as it is termed, which tightens the felt and produces a very smooth and even surface; they are again returned to the drying room and thoroughly dried, when they pass into the hands of the stiffener, and from thence to the blocker in the conical style, who forms them into shape by means of boiling water, which softens and makes the body pliable, when they are stretched over wooden blocks and a cord placed tightly around the lower edge of the block, thus seaming it first, when the brim is formed by frequently dipping the body into boiling water and stretching the brim part into form. They are then ready for the Dye Kettle, a large vessel holding

three hundred gallons of water. After a thorough washing they are again blocked into former shape and thoroughly dried; thence they pass into the pouncers' hands. This operation was formerly done with blocks of cork or gutta-percha cut to conveniently fit the hands, and covered with a piece of fine emery or sand paper and rubbed vigorously over the surface, imparting to the hat a fine velvet-like finish.

Ingenious and labor-saving machinery now performs this work, and one man and a boy can, to-day, pounce thirty dozen hats, where, by the old method, three dozen was considered a good day's work. In this department, we noticed five of these machines. From the pouncers, the hat passes into the finishers' hands, who block it into the desired shape, smooth it with hot irons, steam it so that it becomes soft and pliable, singe all the rough bristly hairs off, and pass it to the stitching room, where numerous sewing machines, propelled by steam power and operated by skillful female operatives, stitch the brims and pass it to the trimmers, where fifty or more girls are busily engaged sewing linings, bands, etc. The last and most delicate operation of all is the flanging or curling. The curler's keen, artistic eye and delicate fingers impart to it the beautiful well-curved and gracefully-rolled brim, adapting it the features of its destined wearer. This operation is exceedingly artistic, requiring, perhaps, the nicest discrimination of the whole process of hatting.

Each department is in charge of an experienced foreman or woman, as the nature of the work may require, and the whole process of manufacturing is generally under the immediate supervision of the proprietor of the establishment.

LEGHORN STRAW HATS.

The Leghorn, or Italian, straw bonnets and hats are celebrated the world over on account of their beautiful texture, pliability, artistic make and high cost.

This modern branch of industry, which is limited to Tuscany, was begun in Florence in the year 1825, and has gradually acquired an importance of from three to five millions of dollars for crude straw for export.

The material used is a special variety of wheat cultivated for this express purpose, the seed of which sells at a much higher price than that of ordinary wheat.

The straw is harvested in the mountainous regions of Prato, Empoli, etc., where the vegetation is poor and stunted, the soil being light and sandy.

The fields are weeded by hand and worked with as much care as a garden plot. Fourteen bushels of seed are usually sown to the acre; two bushels being "broadcast" at each time, and each sowing made at a different angle to the first. The effect of this is to produce a very close, compact growth, and only one elongated stem arises from each seed sown.

The straw is harvested while green and before the ear is fully developed. It is gathered into small sheaves weighing about half a pound each, which are at first placed upright in the field to dry, one acre bearing about three thousand of them. Next day these bundles of straw are spread out over rocks and pebbles in the dry bed of water-courses, where they are submitted to the action of sun and dew. At night they are covered up, great care being taken to protect them from rain. The straw is now bleached by means of sulphuric acid gas.

The next operation consists in taking off the ear below the first joint, in separating the lower useless portion, and in cutting the straw into lengths of four inches. Each blade of straw usually furnishes three such lengths. It is then bleached for the second time by fumes of sulphur.

At this point the straws are sorted according to their various sizes — an operation performed by women who acquire, through long habit, a most remarkable tact in distinguishing the smallest variation in diameters, as may be inferred from the fact that in front of each operator are placed goblets numbered from 30 to 180, each of which is the receptacle for a special size of straw.

The braids are plaited with from eleven to thirteen straws each. Their length is from 300 to 320 feet, their width and the quantity of straw entering into them varying according to quality. With No. 30 straw the braid is coarse and wide, and weighs two pounds and a half. It takes, however, a whole month to plait a single bonnet from such straw. With Nos. 120 to 180 it takes about one pound and a half of straw to a braid. With extra straw —No 180— the braids are not more than 0.039 of an inch in width, and it takes six months' labor to make a sufficiency for a single bonnet for a lady.

The braids are cleaned, exposed to the sun for a short time, and then sent to the manufacturer to be sewed into shape. The last operation is performed with the very greatest care, the stitches being nearly invisible and yet strong, and not liable to unravel during the pressure to which the hats are often subjected after being sized.

The hats are "ungreased," and any bumps or protuberances on their surface are effaced by rubbing one portion of the tissue against another, or by means of friction with a dog skin.

If an accidental tear be made, a piece is immediately inserted into the slit, and so adroitly is this done that the most practised eye can hardly discern the imperfection. The hats or bonnets are then immersed into a warm-water bath containing a certain amount of acetate of lead, and are finally bleached for the last time by means of sulphureous fumes. The pliability of these hats is very remarkable when compared with the common straw fabrics made in other parts of the world.

Imitation Leghorns have of late years been largely made, and with considerable success, in the Canton of Aargau, in Switzerland. The trade from this latter region amounts already to a value of several millions of francs per annum. These hats are neither as fine nor as strong as the genuine, but they sell at much lower prices.

The manufacture of "fancy" straw goods is a remunerative branch of agricultural technology, which might profitably be introduced into the United States. Such work is well paid for, and is of a nature suited to our country women and girls, who could earn a living at home, without being obliged to leave their families.

The seed of Tuscany wheat would probably have to be imported annually from Italy, as it has been proved by careful experiments in various portions of Europe, that it rapidly degenerates in quality whenever grown, for several successive years, in regions far removed from its original place of production.

HISTORY OF STRAW GOODS IN THE UNITED STATES.

In consequence of the heavy importations into the United States of bon-

nets and hats manufactured by the cheap labor of Italy, which came into fashion about 1820, our domestic manufacture of straw goods was checked, and many females turned their attention to imitating the Leghorn bonnet. A Miss Woodhouse, of Weathersfield, Conn., in April, 1821, sent to London a bonnet, accompanied by samples of the raw and bleached material, made of the culm of the indigenous spear, wire or meadow grass, a species of *poa*, and which was laid before the Society for the Encouragement of Arts and Manufactures in that city. The bonnet was admitted by dealers in London to be equal to the best Leghorn in fineness and color; and the Society awarded Miss Woodhouse its large silver medal and twenty guineas. Miss Lucy Burnap, of Merrimack, N. H., about the same time made a bonnet in imitation of Leghorn, which sold at auction for $50 in that city, where premiums as high as $20 were offered for the best specimens of straw bonnets. Miss Burnap, in 1823, took out letters patent for weaving straw and grass for hats and bonnets. Many samples of bonnets made in different places from New England wire grass or straw sold at this time for $30 to $50 each, which cost the females who made them two or three months' labor. In the year last mentioned, it was computed that 300,000 straw bonnets were made in Massachusetts, and valued at $875,000, affording, however but little profit, although much of the braiding was done by children in families, at a small cost for wages.

In order to allow the United States manufacturers to make some profit, the duty was raised in 1824 on Leghorn and other hats, of grass and straw, and braids, from 30 to 50 per cent. *ad valorem*. On the strength of this heavy duty, a straw plaiting school for poor young girls was established that year in Baltimore, but that city has never reached any prominence in the manufacture of straw goods. In 1832 the duty was again lowered to 30 per cent.

SPLIT STRAW GOODS THE INVENTION OF A YANKEE GIRL.

Although the plaiting of round straw hats and bonnets has been carried on for nearly 200 years at Dunstable, England, and still longer in Italy, it appears to be well authenticated that the straw bonnets manufacture in the United States, and particularly the manufacture of split straw goods, was an original invention on the part of Betsey Metcalf, afterward Mrs. Baker, who died about twenty years ago, at Dedham, Mass. In 1798, Miss Betsey Metcalf, at the age of twelve years, having seen a Dunstable bonnet in a store, set to work without any instruction or any opportunity of unbraiding a plait, and by perseverance succeeded in making herself a bonnet of oat straw, which she cut and smoothed with the scissors and split with her thumb nail, and bleached in the vapor of sulphur. An exact *fac simile* of her first bonnet, which was one of seven braid, with bottom inserted like open-work, and lined with pink satin, was afterward made by Mrs. Baker and deposited in the collection of the Rhode Island Society for the Encouragement of Domestic Industry. Having, in subsequent years, gratuitously imparted a knowledge of the art to the young women of Dedham, Wrentham, Providence, and other towns, the business was gradually extended throughout that and neighboring States, until it

has reached its present magnitude. In early times the straw was generally split and flattened with a hot iron and then pasted upon cloth or paper. The plait thus formed was cut into patterns and made up and trimmed according to the prevailing mode.

The introduction into New England of a more durable style of straw plait made of unsplit straw, in closer imitation of the Scotch, has been attributed to a young merchant of Taunton, Mass., who, during a short residence in a Southern State, made the acquaintance of two English females who made up and sold bonnets of the celebrated Dunstable braid. Having observed that females were carefully excluded from their workshop, he noted all the processes from the straw to the finished article, and carried home the details to the straw-workers of his own country. Other improvements were subsequently made, particularly in the art of bleaching, and by the introduction of machinery for cutting and smoothing the straw, shaping and pressing the bonnets, &c. In 1801, the business was commenced at Wrentham, Mass., which was long a principal seat of the manufacture, and in 1810 made about $100,000 worth, which was supposed to be nearly one-half the product of the county, exclusive of the value of hats and bonnets worn by those who made them.

HOW PALM LEAF HATS ARE MADE.

In America, the only places where the leaf of the palm tree is manufactured into wearing apparel are in Massachusetts. Amherst, in Hampshire County, Palmer, in Hampden, and Barre and Fitchburg, in Worcester, are each the site of manufactories, but of these the first named is the largest in buildings, business, and completeness of work. Several of the others perform only a part of the whole course of operations necessary to fit the goods for market.

From Cuba the raw leaf is shipped to New London, Connecticut, in bunches of twenty-five leaves each, and the stock is unloaded and placed on cars which stop at the door of the bleaching house. As delivered, the leaf is from four to five feet long. This, standing on the stock end, is closely packed in the bleaching rooms, where it is kept sixteen days. Brimstone is used to whiten the leaf. The rooms are closed air-tight and the brimstone burnt in pans standing in the room. When bleached to the requisite whiteness, the next process the leaf undergoes is splitting. Nearly a third of all that passes the splitters is absolutely worthless for use here. Till recently it was thrown away; but since paper manufacturers have been straightened for material, this palm leaf has been found to make good paper. Fifty dollars a ton are paid for it at the paper mills.

After the straw is now ready to be worked into hats, all the work must be done by hand. In all the New England States, except Rhode Island, are agents of the firm who send the leaf out into the country among the wives and daughters of the farmers, by whom it is braided into hats and woven into webs for Shaker hoods. Large teams are constantly passing over the rugged hills, carrying material to be braided, or the work that has been finished. The number of people who find employment in this business is very great. Little children are kept at it, for it is light work, and a nimble fingered girl of ten or twelve can earn as much in a day as an adult woman. The pay

for the work is too small to make even decent wages if the worker be not of remarkable deftness of hand, but it is, with many, a work of odd moments which would otherwise be wasted, so the frugal housewife will include in her day's work a "stent" of so much braiding to be done. In some parts of the country, chair bottoming is practiced in the same way. Country merchants frequently take the leaf and put it out in their neighborhoods. They are satisfied if no profit be made on the braiding, for they pay for it from their stores, and make the increase of business thus secured afford them a fair profit. Some, however, make a profit at both ends, and in any case the worker's recompense is a mere pittance.

INVENTION OF STEREOTYPING.

William Ged was a Scotchman, born about the year 1690. For some years he was a thriving goldsmith at Edinburgh, and was considerably noted in the trade for his ingenuity. He invented some tools and processes which facilitated the exercise of his craft, and these he freely made known to persons of the same vocation. It appears that his attention was called to the art of printing by his being employed in paying off the hands in an Edinburgh printing-house, which led him to reflect upon the vast amount of labor absorbed in the production of a book. In those days, a goldsmith performed some of the functions of a banker, and kept other people's gold in his strong box as well as his own. It was probaply in his capacity as a banker that he furnished the money for the payment of the Scottish printers.

It is a curious circumstance that as late as the year 1725, no types were cast in Scotland, although the business of printing had then attained considerable proportions in that country. It seems, too, that the English printers then imported some of their best type from the continent. Young Benjamin Franklin, in that very year, worked as a journeyman printer in London, and he tells us that his master employed fifty men; but notwithstanding this large demand for types, the English printers imported some kinds from Holland, a country which appears to have had in ancient times almost a monopoly of the business of type-founding.

One day in 1725, William Ged fell into conversation with a printer who spoke of the loss it was to Scotland not to have a type-founder nearer than London. The printer showed the ingenious goldsmith some single types, and also composed pages standing ready for the press, and asked him if there was anything so difficult in the manufacture of type that he could not invent a way of doing it.

"I judge it more practicable," replied the goldsmith, "for me to make plates from the composed pages than from single types."

"If," said the printer, "such a thing could be done, an estate might be made by it."

William Ged requested the printer to lend him a page of composed type for an experiment, which he took home with him and proceeded to consider. After several days of experimenting, he appears to have hit upon the right idea. That is to say, he came to the conclusion that the composed page must be cast; but the question remained, what was the proper material in which to cast it; and it was not until two years had elapsed that he discovered the secret. He

appears to have tried the harder and more expensive metals before attempting it in a metal or compound of metals similar to that of the type itself. At the end of two years, he had such success that no one could distinguish an impression taken from one of his cast plates from ordinary print.

From this time he had the usual experience of an inventor. Although not destitute of capital, he offered a fourth interest in his invention to an Edinburgh printer, on condition of his advancing all the money requisite for establishing a stereotype foundry. But this printer, upon conversing with others of the craft, became so alarmed at the expensiveness of the undertaking that he failed to perform his part of the contract. The partnership lasted two years, during which the cautious Scotch printer advanced but twenty-two pounds; and the impatient Ged looked eagerly about him for a more enterprising partner. Thus four years passed away after he had begun to experiment.

A London stationer, William Fenner by name, being by accident at Edinburgh, heard of the invention, and made an offer for a share in its profits. He agreed to advance all the money requisite; and, four months after date, to have a house and materials ready in London suitable for Ged's purpose. The inventor thought it a hard bargain to relinquish one-half the profits of so valuable and costly a conception; but he gladly accepted it, and proceeded to arrange his business for a removal to the metropolis.

Arriving in London at the time appointed, he was sorely disappointed to find that neither house nor material was ready for him. His delinquent partner, who was a plausible fellow, contrived to satisfy him with his excuses, and even induced him to admit into the firm a type-founder on condition of his supplying them with the requisite amount of type. This type-founder, however, furnished them only with refuse type, wholly unsuited to the purpose, which Ged rejected, to the great disgust of both his partners. Not discouraged, he next applied to the king's printers to know if they would take from him stereotyped plates of a certain excellent type which they had recently introduced. A day was appointed for Ged to lay before them in detail his plans and proposals.

Before the day named for the interview, the king's printers very naturally consulted upon the subject the very type-founder who had furnished them with the admirable type which had attracted Ged's attention. The type-founder as naturally pooh-poohed the new system; indeed, laughed it to scorn, and said he would give the inventor fifty guineas, if, in six months, he would make one page of the Bible by the new method, which would produce as good an impression as could be obtained from good type. The interview, however, occurred, and probably Ged would have convinced the king's printers of the feasibility of his plans but for the adverse opinion of an interested man. The printers told the inventor of the offer of fifty guineas, and said that the gentleman who made it was then in the house.

"Being called into our company," Mr. Ged relates, in a narrative dictated on his death-bed, after a long life of disappointment, "he bragged much of his great skill and knowledge in all the parts of mechanism, and particularly vaunted that he and hundreds beside himself could make plates to as great perfection as I could; which occasioned some heat in our conversation."

The dispute was settled at last by a kind of wager. The type-founder and Ged were each of them to be furnished with a page of the Bible in type, and bring back within eight days a stereotyped plate of the same; and he who failed was to treat the whole company. An umpire was appointed — the foreman of the king's printing house — and the parties separated. The result may best be given in Ged's own quaint language:

"Next day about dinner time, each of us had a page sent us. I immediately after fell to work, and by five o' th' clock that same afternoon, I had finished three plates from that page, and caused to take impressions from them on paper, which I and partners carried directly to the king's printing house and showed them to said Mr. Gibb, the foreman, who would not believe but these impressions were taken from the type; whereupon, I produced one of the plates, which, he said, was the type soldered together, and sawed through. To convince him of his mistake, I took that plate from him, and broke it before his face, then showed him another, which made him cry out. He was surprised at my performance, and then called us to a bottle of wine; when he purposed I should take eleven pages more, to make up a form, that he might see how it answered the sheet-way."

Poor Ged had been only too successful; for the printers fancied they saw in this new invention the destruction of their business; and from this time there appears to have been a tacit understanding among them that Ged and his scheme were to be frustrated. At the expiration of the eight days, the type founder failed to keep his appointment, but had the honesty to send word that he could not perform the thing himself, neither "could he get one of the hundreds he had spoken of to undertake it."

The news of Ged's invention circulated in London, and specimens of his plates were handed about, till one of them fell into the hands of the Earl of Mansfield. This nobleman caused the partners to be informed that the office of printer to the University of Cambridge was vacant, and that the heads of the University would be glad to receive them, and award them the privilege of printing Bibles and Prayer Books by the new process. This was joyful intelligence; but the too easy and credulous Ged was not the man to profit by it. Indeed, the opposition of the London printers was so general and so violent, that a stronger man than he might have struggled against it in vain. He now discovered that his partner, Fenner, was not possessed of capital, and they were obliged to admit a fourth partner, who afterwards boasted that he had joined the company for the sole purpose of destroying it.

"As long as I am their letter founder," said he to a leading printer, "they shall never hurt the trade."

The contract, however, was obtained from the University, and Ged went to Cambridge to superintend the work. But he was utterly unable to contend against the opposition of the printers; and the less, because he had not been bred a printer himself. His partners deceived and cheated him; his colleague, the type-founder, sent him damaged and imperfect type. He sent to Holland for a supply. After two months they arrived, but they proved to be so incomplete that an impression taken from them was a little more than a page of blots.

After struggling with difficulties of

this nature for four or five years without being able to complete the stereotyped plates for one Bible or Prayer Book, his patience was exhausted and he returned to Edinburgh, a ruined man. The true cause of his failure was his extreme credulity, which was such as to disqualify him from successfully dealing with men. At Edinburgh his friends, anxious that so valuable an invention should not be lost, made a subscription to defray the expense of stereotyping one volume, and Ged apprenticed his son to a printer in order that he might not be dependent for the necessary assistance upon a hostile body. By the aid of his son, he completed plates for a Latin Sallust, which was printed in the year 1736, and copies of it are still preserved in Scotland as curiosities. As he was unable to procure the best type, this Sallust is not a very fine specimen of stereotyping; but it is a convincing proof that William Ged had mastered the chief difficulties of the art, and that in more favorable circumstances he would have executed work which even at the present day would be considered creditable.

The invention was never a source of profit to the inventor. By the time his son was a sufficiently good compositor to render him valuable aid, and just as they were to embark in business together, he was taken sick. He died in 1749.

It is a proof of the simplicity of his character and of his faith in the value of his invention, that, though he had offers from Holland either to go thither or sell his invention to Holland printers, he always refused.

"I want," said he, "to serve my own country, and not to hurt it, as I must have done by enabling them to undersell by that advantage."

After Ged's death, the secret slumbered till about the year 1795, when it was revived or rediscovered in Paris, and soon after brought to considerable perfection in England. At present the art of stereotyping has been brought to the point, that our daily newspapers are stereotyped every night in from twenty to thirty-five minutes, and as many copies of the plates can be produced as may be desired.

THE MYSTERY OF SLEEP.

What are the differences between sleeping and waking? What is the peculiar nature of that mysterious condition which we call sleep? These are questions long and earnestly asked but never answered. There is something about this phenomenon that seems to defy investigation. The distinctions between the sleeping and waking state are, save a few external differences, as entirely unrecognized to-day as they were ages ago.

Sit by the cradle of a child and watch it as it sinks into quiet slumber. The muscles gradually relax; the eyelids fall; and voluntary motion ceases. The breathing is slower, as is also the action of the heart. The temperature of the body is slightly depressed; and a state of apparent unconsciousness accompanies the physical changes specified. That is all we can see, and yet it seems hard to believe these things are all that constitute sleep. If so, sleep might be accurately defined as a simple cessation of volition, or the action of the will, so that thought and motion of all muscles except those of the vital organs are impossible. But a little thought will show that cessation of will is only one of the manifestations of sleep, and that the will may, and frequently does, only partially

cease to act, retaining command of the voluntary muscles, and giving rise to the phenomenon of somnambulism. At times, also, the mind becomes active in sleep, and often reasons with surprising coherence, and dreams, more or less approximating to realities of waking hours, are produced.

But the mystery of mysteries pertaining to sleep, is the fact that it renovates the system from fatigue. And, after all, this is no greater mystery than fatigue itself. What is fatigue? In what state of mind or body, or of both, does it consist, are questions the answers to which still puzzle the profoundest physiologists.

The periodicity of the desire for sleep is another peculiarity which is still involved in mystery. Why is it that darkness, monotonous noises, the fixing of the eyes upon some stationary object, all favor the approach of sleep? On all these points there is still no certain light. Upon respiration, digestion, circulation, reproduction, and assimilation, some accurate knowledge exists, but of sleep almost nothing. This function, which influences more or less every other, and which has been aptly described as a "partial death from which springs a fresher life," is apparently no less remote from present means of scientific investigation than the greatest mystery of all, life itself.

THE MORGAN HORSE.

There has been much discussion as to the origin of the Morgan horse, and yet we have very little knowledge on the subject that is definite. What we do know is, that about the beginning of the nineteenth century, a man by the name of Justin Morgan, whose life was somewhat checkered — turning his mind to farming one season, and perhaps teaching school the next — owned a little horse of wonderful nerve, a dark bay, with black legs, mane, and tail, standing fourteen hands high, and weighing about nine hundred and fifty pounds. At this time Mr. Morgan lived at Randolph, Vermont, and his horse had much local celebrity. He was a horse of great power for one of his inches, was fleet of foot, and was full of resolution. He was used chiefly under the saddle but was broken to harness.

It was the custom to run him short races on the country roads, and it is said that he was never beaten in these contests. It was also the custom to test his strength by hitching him in front of heavy loads. Where the horse came from and what was his breeding are questions that are largely left to conjecture. There are many stories, but we have learned to look upon them in the light of tradition. If we could put faith in common report, we would discover as much romance in the life of the horse owned by Justin Morgan as Eugene Sue has thrown around the life of the Godolphin Arabian. Where there is room for mystery, there is also room for bright fancy sketches, for rosy pictures of romance. The most plausible theory, however, in regard to the origin of the horse which is known in history by the name of his Vermont owner, Justin Morgan, is that advanced by Mr. John Morgan, a relative of Justin's. He says that the horse was foaled in 1793, that his sire was True Briton, by the imported horse Traveler, and that his dam was of the Wild Air breed. If this pedigree is correct, Justin Morgan was a well-bred horse. Of course the pedigree is disputed, but as for that matter, no pedigree could

be given to the horse that would not be open to objection. All the facts in his remarkable career point to a channel of pure blood, and give the lie to the story that he was a mongrel, and of obscure origin. The life of Justin Morgan was a strange one. It was his lot to labor as few horses have labored — participate in the excitements of the race, be petted and abused, to revel at brief periods in the delights of the stud, and finally, to be neglected in his old age, and to die, caused by a kick in the flank. Old and poor as he was, he might have survived this injury had he received any care ; but he was exposed to the inclemency of a Northern winter, and inflammation setting in, he lay down and died. It was in the winter of 1821, and on the farm of Clifford Bean, about three miles south of the village of Chelsea, Vt., that Justin Morgan breathed his last.

WHEN AND WHERE THE STARS AND STRIPES WERE FIRST DISPLAYED ABROAD.

Capt. G. H. Preble, of the United States Navy, says the New York *Nation,* is collecting material for a history of the American flag, and has succeeded, he says, in getting together a good many anecdotes, incidents and evidences concerning its origin, its transmigration (?), and its first appearance in various parts of the world. He informs the "Historical Magazine" that he has now no doubt that the stars and stripes were first displayed on the Thames by the ship Bedford, of Nantucket. The Bedford was a whaler which left Nantucket under a pass from Admiral Digby, and arrived out on the third of February, 1783, twelve days before proclamation of peace was made, and only a week after the London newspapers had got hold of the terms of the treaty. In the London "Political Magazine" of February 7th, of the year above mentioned, is a passage which reads as follows :–

"THE THIRTEEN STRIPES ARE IN THE RIVER.—Mr. Hammet begged leave to inform the House of a very recent and extraordinary event. There was, he said, at the time he was speaking, an American ship in the Thames with the thirteen stripes flying on board. This ship had offered to enter at the custom house, but the officers were at a loss how to behave. His motive for mentioning the subject was that ministers might take such steps with the American Commissioners as would secure free intercourse between this country and America."

It is a curious fact that the Maria, a vessel that has been named by some writers as a contestant for the honor due the Bedford, and which certainly was in the Thames in the course of the year 1783, is still afloat and in use. The Confederate States cruisers forced the old ship to take refuge under the Chilian flag, and she now sails from Talcahuana as a whaler. But the first display of the thirteen stripes in England was not from the masthead of a vessel. When the king, on the 5th of December, 1782, in his speech from the throne, recognized the existence of the United States as a nation, Mr. Copley, the painter, who was among his hearers, went home and put the new ensign into the background of a portrait, that of Elkanah Watson — which he had upon his easel at the time. He had kept the background unfinished, reserving it as a place "to represent a ship bearing to America the intelligence of the acknowledgment of American Independence, with the rising sun of the new born nation streaming from her gaff."

LENGTH OF WHALES.

Mr. Scoresby, a very high authority on this subject, declares that the common whale seldom exceeds seventy feet in length, and is much more frequently under sixty. Out of 322 whales, which he assisted personally in capturing, not one exceeded fifty-eight feet, and the largest which he knew the reported measurement to be authentic came up to only sixty-seven feet. Two specimens of the rorqual or razor-back whale have been observed of 105 feet in length. One of these was found floating lifeless in Davis Straits, and the skeleton of the other was seen in Columbia River, and must, tail and all when alive, have measured 112 feet. Other specimens have measured a hundred, and many others from eighty to ninety feet. One cast on shore at North Berwick, Scotland, and preserved by Dr. Knox, was eighty-three feet in length. These instances seem to establish the average of these huge animals. But with considerable credulity in earlier accounts, Cuvier, the eminent naturalist, says, stoutly: "There is no doubt that whales have been seen in certain epochs and certain seas upward of 300 feet long, or 100 yards long."

THIMBLE MAKING.

The manufacture of thimbles is very simple and interesting. Coin silver is mostly used, and is obtained by purchasing coin dollars. Hence it happens that the profits of the business are affected instantaneously by all the variations in the nation's greenback promises to pay. The first operation strikes a novice as almost wicked, for it is nothing else than putting a lot of bright silver dollars, fresh from the mint, into dirty crucibles, and melting them up into solid ingots. These are rolled out into the required thickness, and cut by a stamp into circular pieces of any regular size.

A solid metal bar of the size of the inside of the intended thimble, moved by powerful machinery up and down in a bottomless mould of the outside of the same thimble, bends the circular discs into the thimble shape as fast as they can be placed under the descending bar. Once in shape, the work of brightening, polishing and decorating is done upon a lathe. First, the blank form is fitted upon a rapidly revolving rod. A slight touch of a sharp chisel takes a thin shaving from the end, another does the same on the side, and the third rounds off the rim.

A round steel rod, dipped in oil and pressed upon the surface, gives it a lustrous polish. Then a little revolving steel wheel, whose edge is a raised ornament, held against the revolving blank, prints that ornament just outside the rim. A second wheel prints a different ornament around the center, while a third wheel with sharp points makes the indentions on the lower half and end of the thimble. The inside is brightened and polished in a similar way, the thimble being held in a revolving mould. All that remains to be done is to boil the completed thimbles in soap-suds to remove the oil, brush them up, and pack them for the trade.

IRON PAPER.

In the great exhibition of 1851, an American specimen of iron paper was exhibited. A lively competition in iron-rolling ensued among British iron manufacturers, excited by the above challenge from America, as to the thinness to which iron could be rolled

cold. Mr. Gillett rolled sheets the average thickness of which was the eighteen hundredth part of an inch. In other words, one thousand eight hundred sheets piled upon each other would collectively measure an inch in thickness, whilst the thinnest tissue paper to be purchased in the stationers' stores measures the twelve hundredth of an inch. These very thin iron sheets are perfectly smooth and easy to write on, although porous when held up to a good light. It may not be out of place, considering the great interest that is taken by those connected with that great branch of industry, the iron trade, to give a few curious particulars as to the extent iron can be welded, and the thin sheets that can be rolled out. Brother Jonathan little thought what a hubbub would be created in the old country when from Pittsburgh he sent that wonderful letter, written on a sheet made from iron, which took no less than one thousand sheets to make an inch in thickness, the dimensions being eight inches by five and a half inches, or a surface of forty-four inches and weight sixty-nine grains.

HOW RICH MEN BEGAN LIFE.

Mashall O. Roberts is the possessor of $4,000,000 or $5,000,000, and yet until he was 25, he did not have $100 he could call his own.

George Law at 45 was a common day-laborer on the docks, and at present counts his fortune at something like $10,000,000.

Alexander T. Stewart first bought a few laces at auction, and opened his way to success in a dingy shop on Broadway, the site of the wholesale establishment.

Daniel Drew, in early life, was a cattle driver at the munificent rate of 75 cents a day, and he has driven himself into an estate valued at from $25,000,000 to $30,000,000.

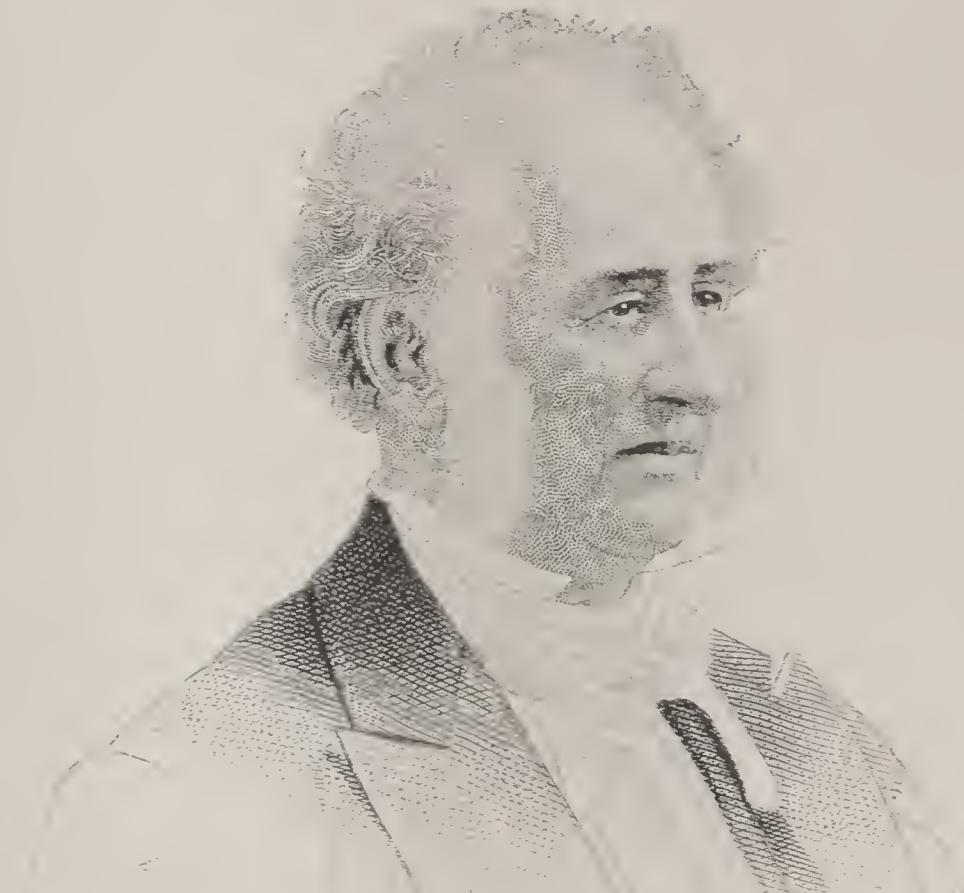
Robert L. and Alexander Staught, the noted sugar refiners, in their boyhood sold molasses candy, which their widowed mother made, at a cent a stick, and to-day they are probably worth from $5,000,000 to $6,000,000 each.

Horace B. Claflin, the eminent dry goods merchant, worth, it is estimated, from $12,000,000 to $15,000,000, commenced the world with nothing but energy, determination and hope, and see how he has invested them!

Cornelius Vanderbilt began life with an old pirogue, running between Staten Island and New York, and carrying garden stuff to market. With $2,000 or $3,000 raised from that source, he he entered upon steadily increasing enterprises, until he has accumulated $50,000,000.

ESQUIMAUX MARRIAGE CEREMONY.

In an account of the marriage ceremonies of the Esquimaux given by Dr. Hayes, he says: "The match is made by the parents of the couple. The bridegroom must go out and capture a polar bear, as an evidence of manly courage and strength. Then he is told he can marry, if so inclined; and, like most bachelors, he is generally so inclined. He sneaks behind the door of his inamorata, and when she comes out he pounces upon her and undertakes to bear her away to his dog-sledge. She kicks, bites, screams, and breaks away from him. He chases her, and the old women of the settlement come out with frozen strips of seal-skin and give her a thwack. After running the gauntlet of these old



CORNELIUS VANDERBILT.

women, she falls down exhausted and surrenders. The bridegroom then lashes her to his sledge, and, whipping up his dogs, they fly over the frozen snow, and the wedding is consummated.

HISTORY OF ADVERTISEMENTS.

Advertising bills (posters) are as old as streets themselves. At Athens, they served specially for the publication of the laws, and were written on rollers of wood which turned on a pivot; at Rome, they served more various purposes, and besides conveying a knowledge of the laws and decrees to citizens, they announced books on sale, auctions, etc. Booksellers were the first who made use of publicity, and when they got out a new book, they caused its title to be written in huge letters on their shop-fronts or on the columns appropriated to notices. These were the *advertising columns* of those days. In the middle ages, when very few knew how to read, the public crier was substituted, and went from place to place, proclaiming information, accompanied by a sounding of trumpet. Francis I. was the first who decreed that his ordinances should be written on parchment in large characters, which parchment should be attached to a board.

In the seventeenth century, bills came to be what they are now; commercial and judicial notices were posted up, and booksellers employed this means of making their wares known. In 1722, a decree decided that there should be forty bill-stickers for the City of Paris. Since this period, the number has been constantly increasing, and traders, not content with paper and printing, have taken to painting, and engross entire walls. In Paris there are some advertisements which cover a house five stories high.

Theater bills also have a very ancient origin, for though the Greeks did not use them, they were employed among the Romans. At first a crier summoned the citizens to repair to the games; but bills soon after made their appearance, and Plautus speaks of some with characters more than a cubit long, like the giant circus-posters of our own time and country. In the middle ages, on the cessation of plays, play-bills of course there were not; and when the "Mysteries," or sacred dramas, made their appearance, they were on stated celebrations and festivals, and required no announcement, as every one knew beforehand the place, time and character of the entertainment. Afterwards, when the extent and population of cities increased, criers made their appearance, and addressed the public very much to their annoyance; which our present system of advertising has most happily set aside.

SAW MILLS.

Wood saw mills were erected as early as the fourth century in Germany. They were driven by the water of the river Roer. It is said that there is now in Paris a manuscript of the thirteenth century showing a saw mill with a complete self-action and driven by a water-wheel. They were erected by the Spaniards in the island of Madeira in 1420, and in Breslau, Norway, and Rome some years later. A mill having a gang of saws and capable of sawing several boards at once, was in operation on the Danube near Ratisbon in 1575. In England a mill was erected in 1663 by a Dutchman, and was abandoned on account of the opposition of the popu-

lace. In 1802 Oliver Evans, of Philadelphia, constructed an engine for a boat to run between New Orleans and Natchez. The boat was high and dry on reaching the Mississippi, and could not be floated until a rise. The engine was set up in a saw mill, and sawed at the rate of 3,000 feet of boards per day. The hand sawyers, who thought their occupation would be gone, burned the mill. There are mills constructed and now in operation in the United States capable of sawing 160,000 feet of lumber, board measure, in twenty-four hours.

HOW RAIN IS FORMED.

To understand the philosophy of this phenomena, essential to the very existence of plants and animals, a few facts derived from observation and a long train of experiments must be remembered. Were the atmosphere everywhere, at all times, at a uniform temperature, we should never have rain, hail, or snow. The water absorbed by it in evaporation from the sea and the earth's surface would descend in an imperceptible vapor, or cease to be absorbed by the air when it was once fully saturated. The absorbing power of the atmosphere, and consequently its capability to retain humidity, is proportionably greater in warm than in cold air. The air near the surface of the earth is warmer than it is in the region of the clouds. The higher we ascend from the earth the colder we find the atmosphere. Hence the perpetual snow on very high mountains in the hottest climates. Now, when from continued evaporation the air is highly saturated with vapor — though it be invisible — if its temperature is suddenly reduced by cold currents descending from above, or rushing from a higher to a lower latitude, its capacity to retain moisture is diminished, clouds are formed, and the result is rain. Air condenses as it cools, and, like a sponge filled with water and compressed, pours out the water which its diminished capacity cannot hold. How singular, yet how simple, is such an admirable arrangement for watering the earth.—*Scientific American.*

THE GREAT EASTERN.

Below we give, for future reference and remembrance, the full particulars concerning the dimensions and structure of this mammoth wonder of the ocean :

Length between perpendiculars, 680 feet.

Length over all on upper deck, 691 ft.

Breadth of hull, 83 feet.

Hight from bottom of ship to top of iron of upper deck, 58 feet.

Diameter of paddle-wheels, 56 feet.

Diameter of screw-propeller, 24 feet.

Weight of screw-propeller, 40 tons.

Hight of principal saloons, 13 feet.

Weight of iron in the construction of hull, 7,000 tons.

Weight of ship, with machinery coals, cargo, and full equipment, about 26,000 tons.

Draught of water at that weight, 30 feet, 6 inches.

Weight of each of the four paddle-engine cylinders, about 30 tons — the diameter of the cylinders being 84 inches — length of stroke 14 feet.

The paddle-engines are over 1,200 horse-power.

Weight of each of the four screw-engine cylinders, about 20 tons — their diameter being 84 inches.

The screw-engines are about 1,600 horse-power.

Weight of shafts for paddle-engines, 80 tons.

Weight of shafts for screw-engines, 150 tons.

Number of boilers to paddle-engines, four; whose weight, including funnels, is 408 tons.

Number of boilers to screw-engines, six; whose weight, including funnels, is 567 tons.

Thickness of the plates in bulkheads, ½ inch; in the skins, ¾ inch.

Number of rivets used in construction, 3,000,000.

Number of masts, 6; of these three will be square-rigged, the other two fore-and-aft rigged.

Quantity of canvas in the sails, about 9,200 yards.

There will be two screw steamers, one carried on each side, abaft the paddle-boxes, as jolly-boats. Their dimensions are: Length, 1 00 feet; beam, 16 feet; measurement, 120 tons; horse-power, 40.

And there will be about 20 ordinary boats carried in addition, with masts and sails complete.

THE CHESS BOARD.

It is related of the inventor of the game of chess, that on being promised by the king whom he first taught the game that he should have any reward he might ask for, meekly replied that he would be content if the king would give him one kernel of wheat on the first square, two on the second, four on the third, eight on the fourth, and so on, doubling up to the sixty-fourth square. The king gladly acceded to this seemingly modest request, and ordered his attendants to bring in the wheat — which they began to do; but, to the astonishment of the monarch, it was found that there was not wheat enough, and never had been enough in his dominions, to pay off the crafty inventor. A correspondent, who has been "figuring on it," says that, to fulfill the king's promise, it would take thirty trillions, twenty-seven billions, ninety-seven millions, one hundred and eighty-four thousand, four hundred and eighty-five bushels of wheat — allowing 600,000 kernels to the bushel. This would cover the States of New York, New Jersey, Pennsylvania and Delaware all over with wheat to the depth of a mile and a quarter. Were the kernels laid together, end to end, they would reach two billions, three hundred and twenty-seven millions, eight hundred and ten thousand, three hundred and ninety-two times around the earth. Here is the exact number of kernels the chess inventor asked for — 9,627,268,786,934,775,168!

COLD TIMES.

In 401 the Black sea was entirely frozen over. In 763, not only the Black Sea, but the Straits of Dardanelle, were frozen over; the snow in some places rose fifty feet high. In 822, the great rivers of Europe — the Danube, the Elba, etc., were so hard frozen as to bear heavy wagons for a month. In 860, the Adriatic was frozen. In 991, everything was frozen, the crops entirely failed, and famine and pestilence closed the year. In 1067, most of the travelers in Germany were frozen to death on the roads. In 1134, the Po was frozen from Cremona to the sea; the wine-sacks were burst, and the trees split, by the action of the frost, with immense noise. In 1237, the Danube was frozen to the bottom, and remained long in that state. In 1317, the crops wholly failed in Germany; wheat, which some years

before sold in England at 6s. the quarter, rose to £2. In 1308, the crops failed in Scotland, and such a famine ensued that the poor were reduced to feed on grass, and many perished miserably in the fields. The successive winters of 1422-3-4 were uncommonly severe. In 1368, the wine distributed to the soldiers was cut with hatchets. In 1683 it was excessively cold. Most of the hollies were killed. Coaches drove along the Thames, the ice of which was eleven inches thick. In 1709 occurred the cold winter; the frost penetrated the earth three yards into the ground. In 1716, booths were erected on the Thames. In 1744, the strongest ale in England, exposed to the air, was covered in less than fifteen minutes with ice an eighth of an inch thick. In 1809, and again in 1812, the winters were remarkably cold. In 1814 there was a fair on the frozen Thames.

USE FOR SAWDUST.

A correspondent of an English exchange thus speaks of an utilization of sawdust:

"It will probably be of some interest to your readers to learn that some exquisite specimens of work, vieing with the finest carvings, have been turned out by the cabinet-makers of the Faubourg St. Antoine, Paris. It appears that by the simultaneous application of great pressure and heat, these ingenious workmen have succeeded in causing the particles of sawdust to agglutinate, so that if compressed in a mould the result is a solid mass, of any desired shape, presenting a brilliant surface, and endowed with a durability and beauty of appearance not found in ebony, rosewood, or mahogany. This product is known as *bois dure*. Another very peculiar body, which approximates more to boxwood in appearance, is formed by the admixture of glue, phosphate of lime, alum and sawdust, a kind of dough being formed with boiling water, which admits of being pressed into moulds. This compound also takes a very high polish. An application of somewhat similar nature has been made in Canada, by J. Kent Griffin, who took out a patent for making a composition for pavements, blocks for buildings, etc., from sawdust or disintegrated wood, mixed with silicate of soda and asphalt, and then heated."

DOLLS' SHOES.

The manufacture of dolls' shoes, although partaking more of the toy trade than of regular shoe-making, has grown so rapidly of late years, that a few facts concerning it will, no doubt, be of interest. Quite a business is done in these little articles by some of the dealers in findings and small wares for the shoe-trade in some of the large cities. They are retailed in most of the toy and fancy-goods stores, and about holiday time are in active demand.

Within the past six or eight years, this business has grown into considerable importance, and there are several manufacturers who devote their whole time to this department, employing quite a number of operatives. They make use of scraps of morocco, etc., from shoe manufactories and bookbinders, which formerly were thrown away. At first the shoes were of the simplest character, and as far as any special shape was concerned, were mere semblances of shoes. But within two or three years, there has been much improvement made in the style and mode

of manufacture — the fashions of the day are followed closely, and the pets of the household must have their dolls dressed in every respect similar to older people, and, therefore, several pairs of shoes must be provided for the several dresses — slippers, ties, walking-boots, shoes, etc., and in various colors. They must be made to button, tie or lace, as the case may be.

One of the most popular makers of these articles makes 50,000 pairs per annum, using about 20,000 feet of morocco and sheep, mostly of scraps, besides cutting considerable whole stock, of all the fashionable colors — yellow, bronze, blue, red, pink and cuir — which sell to finding dealers at $1.50 to $4.50 per dozen. There are two grades of shoes, one for common dolls, and the other for wax dolls — the latter of which are made with great care, and are really a very neat and pretty article, some of them being large enough for a flesh-and-blood baby of tender months.

THE HISTORY OF ZERO.

"Zero," on the common thermometer, like the fanciful names of the constellations, is an instance of the way wise men's errors are made immortal by becoming popular. It may be worth while to say that the word itself (zero) comes to us through the Spanish from the Arabic, and means empty, hence nothing. In expression like "90 deg. Fahr." the abbreviation Fahr., stands for Fahrenheit, a Prussian merchant of Dantzic, on the shores of the Baltic sea. His full name was Gabriel Daniel Fahrenheit.

From a boy he was a close observer of nature, and when only nineteen years old, in the remarkable cold winter of 1709, he experimented by putting snow and salt together and noticed that it produced a degree of cold equal to the coldest day of that year. As that day was the coldest the oldest inhabitant could remember, Gabriel was the more struck with the coincidence of his little scientific discovery, and hastily concluded that he had found the lowest degree of temperature known in the world, either natural or artificial. He called that degree zero, and constructed a thermometer, or rude weather glass, with a scale graduated up from the zero to boiling point, which he numbered 212, and the freezing point 32 — because, as he thought, mercury contracted the thirty-second of its volume on being cooled down from the temperature of freezing water to zero; and expanded 180th on being heated from the freezing to the boiling point.

Time showed that this arrangement, instead of being truly scientific, was as arbitrary as the division of the Bible into verses and chapters, and that these two points no more represented the real extremes of temperature than "from Dan to Beersheba" expressed the exact extremes of Palestine.

But Fahrenheit's thermometer had been widely adopted with its own inconvenient scale, and none thought of any better until his name became an authority, for Fahrenheit finally abandoned trade and gave himself up to science. Then habit made people cling to the established scale, as habit makes the English cling to the old system of cumbrous fractional money.

Our nation began to use Fahrenheit's thermometer about the middle of the last century, or not far from the time when old style was exchanged for new style in the writing of dates.

The three countries which use Fahrenheit are Holland, England and

America. Russia and Germany use Reaumer's thermometer, in which the boiling point is counted 180 degrees above freezing point. France uses the centigrade thermometer, so called because it marks the boiling point 100 degrees from freezing point.

On many accounts the centigrade system is the best, and the triumph of convenience will be attained when zero is made the freezing point, and when the boiling point is put 100 or 1,000 degrees from it, and all the sub-divisions are fixed decimally.

If Fahrenheit had done this at first, or even if he had made it in one of his many improvements after the public adopted his error, the luck of opportunity which was really his, would have secured to his invention the patronage of the world.

WHAT IS STEEL?

Ralph Crooker, of Boston, and well known throughout the New England States as a rolling-mill man, asks and answers the above question in a neat circular, thus:

"STEEL. — A combination, or an alloy, of iron, that will forge, harden and temper."

There are various kinds of steel — such as carbon cast steel, tungsten cast steel, chrome cast steel, cyanogen cast steel, and titanium cast steel; and several other metals have been alloyed with iron to make steel.

There is also blistered steel, which is made from malleable bar iron by a process called cementation; German steel, which is made directly from the ore, and sometimes from pig iron, in the Catalan forge; and steel which is made from other processes.

The line between cast iron and steel is — when it is capable of being forged, it is steel; and when it will not forge, it is cast iron. And the line between malleable iron and steel is — when it will harden and temper, it is steel; and when it will not harden and temper, it is malleable iron.

Cast steel will harden slightly when it contains from 0.25 per cent. to 0.30 per cent. of carbon, and ceases to be capable of forging if it contains much more than 1.75 per cent. of carbon.

SLEEPING BEDS.

During all ages, from the earliest times, men have displayed their invention in designing beds which should gratify their natural love for comfort, for elegance, and for luxury. In the pre-historic times the dwellers in the caves most probably followed the suggestion given them by the animals which they drove out from their rocky dens, in this early stage of the "struggle for existence," and made their beds of leaves. From this condition to providing skins for the coverings of their couches was a great advance, and with their increasing ability to dominate their surrounding conditions, and provide the materials for gratifying their natural as well as artificial wants, this step was but the first in a long course of invention and improvement applied to beds.

Among the Romans and the Greeks, as well as other nations of antiquity, such an appliance as a mattress was unknown. They made their beds upon couches of wood, which were covered with skins, furs, woolen and other stuffs. Their luxury in beds consisted only in using more expensive coverings, replacing a sheep's skin by a tiger's, or substituting for a rough woolen blanket one of finer texture, or a shawl of silk embroidered in gold

or silver thread. These improvements, or those consisting in replacing the wooden bench which formed their support with one of bronze, or even of gold or silver, was really only a display of greater wealth, but could not be considered in these days an advance towards securing the advantages of a comfortable, luxurious and healthy bed.

In the early period of modern history, beds were almost universally, in Europe, nothing but bundles of straw. As late in England as the times of Queen Elizabeth, when no carpets were used, and the floor was strewn with rushes, the beds were hardly anything better, and a wooden bench, or any rude framework which lifted the bed above the floor, was a luxury. Erasmus, in his letters, describes the social condition of the people during the reign of Henry VIII., and was disgusted at the state of the floors. The rushes, he says, were so seldom changed, and became so damp that the feet were constantly kept wet, and thence colds and consumption were quite common. In the dining rooms, he speaks of the filth collected on the floor among the rushes; the bits of meat and bones thrown to the dogs, who fought around the guests' legs for them; the beer and wine emptied upon the floor; the slices of bread, used as plates for eating their meat on, and then thrown aside; altogether giving us no very high conception of the neatness and fine breeding of the time.

From Delaroche's fine picture of "The Death of Queen Elizabeth," an accurate idea can be gained of the beds of royalty at this period, and consequently those of the common people can be imagined. By a careful study of the times, and from all the contemporary evidence bearing upon this point, Delaroche was enabled to reproduce the scene with a truthful accuracy of detail. The queen is reposing upon a bed formed by spreading cloths upon the floor. She is covered with richly embroidered spreads of velvet, bordered with golden fringe. The moment chosen is when she is upbraiding the Countess of Nottingham for keeping back the ring Essex had sent to his royal mistress just before his execution. The queen herself is gorgeously attired, as was her constant custom, but the comparison between the brilliant coverings of her bed and its position, one which now would be considered as in the dirt, affords an admirable picture of the partial civilization of the times, with its splendor of display, and its want of the simplest decencies of the present.

STRENGTH OF METALS, WOODS, Etc.

It is a remarkable provision of nature that iron which is most abundantly yielded by the earth, is also the strongest of all known substances. Made into the best steel, a rod one-fourth of an inch in diameter will sustain 9,000 pounds before breaking; made into soft steel, a rod of the same dimensions will sustain 7,000 pounds; into iron wire, 6,000; wrought, 4,000; inferior bar-iron, 2,000, and cast iron, 1,000 to 3,000. A bar of copper-wire of the same size will sustain 3,000 pounds; of silver, 2,000; of gold, 2,500; tin, 300; cast zinc, 160; cast lead, 50; and milled lead, 200. Of wood, a bar of box and locust of equal size will sustain 1,200 pounds; of toughest ash, 1,000 pounds; elm, 800; beech, cedar, white oak and pitch pine, 600; chestnut and maple, 900; and poplar, 400. Wood which will bear a heavy weight for a minute or two will break with two-thirds the

force acting a long time. A rod of iron is about ten times as strong as a hemp cord. A rope an inch in diameter will bear about two and a half tons, but in practice it is not safe to subject it to a strain of more than about a ton. Decrease the rope in diameter one-half, and its strength will decrease three-fourths. Thus a rope half an inch in diameter will sustain one-fourth as much as a rope an inch in diameter.

THE FIRST PLANING MACHINE.

It is an interesting question as to where the first planing-machine was made; according to the London *Iron Trade Exchange*, it was built in the Holland street works of John Rennie the elder. "In March, 1814, (and we copy from an original memorandum book of the late George Rennie,) the following plan was adopted for chipping the cast-iron sides of a new lathe: The sides are placed close together, with their faces upward; two planks of elm, one on each side, are bolted with their edges truly placed end upward; upon the edges of the planks run four wheels on axles, which support a truck of oak. To the truck is fixed a slide-rest, to which is attached a cutting tool; the truck is well loaded with weights, and pulled along the surface of the elm planks by means of a crab and chain. Thus the tool planes the iron lathe-beds straight." This was, in fact, the first planing-machine, crude and rude as it was, and from it Whiteworth, to whom the original apparatus was shown, subsequently made a self-acting machine. We all know how important a tool it has become, and the wondrous saving it effects in the manufacture of nearly every kind of machinery.

THE FIRST UMBRELLA.

It is generally stated that it is to Jonas Hanway, the well-known philanthropist, that we are indebted for the valuable example of moral courage in first carrying an umbrella in the streets of London. It is difficult now to conceive the amount of persecution which this strange proceeding entailed upon this unfortunate philanthropist, whose object was, doubtless, less the protection of his own person than that of showing his countrymen how they might avoid those continual drenchings to which they had so long submitted. The hackney coachmen and sedan chairmen were the first to cry out against the threatened innovation, declaring that they were ruined if it came into fashion. When they began to be carried, even a gentleman accompanied by a lady, under the shelter of the new-fangled rain-protector, was hooted as he passed along, while a gentleman alone, carrying one, was certain to be met with cries of "Frenchman! Frenchman! why don't you call a coach?" and other more offensive salutations.

CAMPHOR WATER AS A GERMINATOR.

Many years ago it was discovered and recorded that water saturated with camphor has a remarkable effect upon the germination of seeds. A Berlin professor has lately established the fact that a solution of camphor stimulates plants as alcohol does animals. He took seeds of various species of beans and pear, of varying ages, and put some between sheets of paper wet with water and others between sheets dipped in a solution of camphor. In many cases, the seeds moistened simply with water did not swell at all; while in

every instance those subjected to the camphor solution speedily germinated. A long series of experiments showed the unvarying result of a singular awakening of dormant vitalism and a wonderful quickening of growth by the application of camphor. The effect was lasting, the plants stimulated by the drug continuing to develop with uncommon vigor. On the other hand, when powdered camphor was mixed with the soil, the effect was deleterious. These experiments afford a hint to farmers and gardeners for the treatment of seeds and grain.

REFINED CAMPHOR.

Crude camphor, as brought to this country, is refined here by being introduced together with quicklime into cast-iron vessels, which serve as retorts, over which are placed covers of sheet-iron connected with the lower vessels by a small aperture.

A number of these stills are placed in a large sand bath, and, after the smelting of the camphor within them, kept at a uniform temperature, that the process may go on quietly. The quicklime serves to retain the moisture that otherwise would interfere with the condensation of the pure camphor. This takes place under the shelf upon which the cone stands; the vapor, when in excess, passing into the loosely affixed cones of sheet-iron, and great care being taken to keep the hole open.

A great deal of attention and experience are requisite to successfully refine camphor, but the process is now well understood in this country as well as in Europe, and what is sold in this market is refined here, and is of satisfactory quality and appearance.

SHIRTS.

The word "shirt" is derived from the Anglo-Saxon *sceort,* short, that probably from the Latin *curtus*, having a similar meaning; so that shirt is literally a short garment. It was called by our Saxon ancestors indiscriminately sherte or camise (chemise), and the undermost garments of both sexes were then of similar shape and materials. It began to be decorated with embroidery under the Normans when worn by the nobility. In the reign of Henry VII. decorated shirts are named, but in that of Henry VIII., paintings and drawings of Holbein furnish us with actual representations of luxurious embroidered shirts.

A shirt of silk is mentioned in the romance of *Li beau disconus* (14th century), and a shirt of fine holland in the *25th Coventry Mystery.* It is a practice in some countries for the bride to present her intended husband with an embroidered wedding Shirt. In the old Scotch song of "Gilderoy," we have an instance:

"For Gilderoy, that luve of mine,
Gude faith I freely bought,
A wedding sark of Holland fine,
Wi' silken flowers wrought.

FIRE.

According to Pliny, fire was a long time unknown to some of the ancient Egyptians, and when a celebrated astronomer showed it to them, they were absolutely in raptures. The Persians, Phœnicians, Greeks, and several other nations, acknowledged that their ancestors were once without the use of fire, and the Chinese confess the same of their progenitors. Pompanion, Mola, Plutarch, and other ancient writers speak of nations which, at the time when they wrote, knew not the

use of fire, or had just learned it. Facts of the same kind are also attested by modern nations. The inhabitants of the Marian Islands, which were discovered in 1551, had no idea of fire. Never was astonishment greater than theirs when they saw it on the desert in one of their little islands. At first they thought it was some kind of animal that fixed to and fed upon wood.

THE VANILLA BEAN.

The vanilla bean grows on a vine which, although growing from the root, is a parasite, as it will grow even cut from the root, for it takes its substance from the tree around which it clings by means of its thousands of fine tendrils. Like all parasites, there are trees which are particularly adapted to its support. They are planted about ten feet apart, in rows, at the foot of small trees which are left in clearing the lands. They begin to bear the third year, and, in favorable years, give from $400 to $1,000 per acre. No cultivation is needed but to cut down the grass and weeds; no plowing or spading being necessary. The bean is often gathered in September and October, but as it is not yet ripe, the vanilla is of inferior quality, and sells for a low price; but if left till the end of November or December it comes to perfection. It is then gathered carefully and spread out in the sun on mats, if the weather be favorable, but if otherwise it is placed in ovens, which process changes the color from a pale green to a deep rich brownish or purple, and at the same time develop the oil which, on pressure, exudes from the bean. They are then packed in blankets while warm, and put into large tin cases to go through a sweating process, again put in the sun and again in the blankets, until they attain the proper color. They are then placed in a dry room upon shelves made of some open material, so that the air can circulate around and under them. This evaporates all the watery part. In 1870, in New York, the value was $60 to $70 per 1,000 beans; in 1875, they were worth from $130 to $180 per 1,000; such has been the increase in the consumption, without a proportionate increase in the cultivation. The people will work only about one hundred days in the year, which provides them with all they need, and as they will do no more there is very little increase in the production of any thing. When the beans are assorted they are tied up neatly in bunches of fifty beans each, and packed in cases of tin holding from 2,000 to 3,000. These tin cases are lined with tinfoil, and a ticket put on the lid giving the quality, size and quantity. Some five or six of these tin cases are put into a neatly made cedar chest, which is sometimes lined with zinc and hermetically sealed so as to prevent moisture from getting to the vanilla in transporting, which would ruin it. These cedar cases are then sewed in mats, and these are covered with a coarse bagging to avoid the dangers of transportation on mules. In this manner all the Mexican vanilla goes to places of sale in Europe and the United States, where it is worth from $9 to $20 per pound, the thousand beans weighing from nine to ten pounds. Formerly France was the great market for vanilla, but the enterprise of some of our American merchants has diverted the trade to New York, which is now the great depot of vanilla and parties from Europe come to New York to buy.—*Report of Department of Agriculture.*

THE DOME OF THE CAPITAL.

The dome of the Capital at Washington is the most ambitious structure in America. It is 180 feet higher than the Washington Monument at Baltimore, 68 feet higher than Bunker Hill, and 22 feet higher than Trinity church spire, New York. It is the only considerable dome of iron in the world. It is a vast hollow sphere of iron weighing 8,000,300 pounds. How much is that? More than 4,000 tons, or about the weight of 70,000 full-grown people, or about equal to a thousand laden coal cars, which holding four tons apiece, would reach two miles and a half. Directly over head is a male figure in bronze, "America," weighing 13,985 pounds. The pressure of the iron dome upon its piers, and pillars is 14,477 pounds to the square foot. St Peter's presses nearly 20,000 pounds more to the square foot, and St. Genevieve, at Paris, 65,000 pounds more. It would require 755,280 pounds pressure to the square foot to crush the supports of the dome. The cost was about $1,000,000

MEDICAL PROPERTIES OF EGGS.

The white of an egg has proved of late the most efficacious remedy for burns. Seven or eight successive applications of this substance soothe pain, and effectually exclude the burn from the air. This simple remedy seems to be preferable to colodion or even cotton. Extraordinary stories are told of the healing properties of a new oil which is easily made from the yolk of hen's eggs. The eggs are first boiled hard; and the yolks are then removed, crushed and placed over a fire, where they are carefully stirred until the whole substance is just on the point of catching fire, when the oil separates and may be poured off. One yolk will yield nearly two teaspoonfuls of oil. It is in general use among colonists of South Russia as a means of curing cuts, bruises and scratches.

BLACK RAIN.

There are on record several incontestible instances of black rain having fallen, among which the following may be mentioned: Professor Barker, in April, 1849, laid before the Royal Dublin Society some observations on a shower of black rain which fell around Carlow and Kilkenny, and extended over an area of about 400 square miles. He presented to the Society a specimen which had been forwarded to him, the person who had collected it mentioning that at the time that it fell it was uniformly black, and resembled ordinary writing ink. Dr. Barker found, however, that after allowing it to stand for a short period, the black coloring matter separated from the water with which it had been mixed, rendering the color of the rain much lighter than at first. This shower was preceded by such darkness that it was impossible to read except by candle-light. After this darkness had continued for some time, a hail-storm occurred, attended with vivid lightning, but without thunder, and when this subsided the black rain fell. On examination of the rain just after it had fallen, it was found to have an extremely fœtid smell, and a very disagreeable taste; it left a stain upon some clothes on which it had fallen, and cattle refused to drink it. A similar shower occurred near Northampton in July of the following year, and was thus described by the Rev. J. T. Tryon, of the Bulwick Rectory. It fell about

three or four o'clock in the afternoon, rendering quite black the people's clothes on the hedges, and those spread on the grass to dry; also giving to the water caught in tubs and vessels from slated and tiled houses, almost the color of ink. Some rain which had fallen in the morning had been perfectly clear, and the black rain appeared to fall from one particular cloud. "It caused," said Mr. Tryon, "a black-lead froth at the top of my tub, so that I myself collected three or four bowls of such froth therefrom. Three days after, two boys loading my wagons with clover were rendered as black as chimney sweepers, from the black sediment the rain had left thereon. My shepherd's inexpressibles, up to the knees, were rendered of the like color after shepherding his sheep, so that it appears the shower was not confined to this parish."

HOW TO TAKE CARE OF CHINA AND GLASSWARE.

In average households few things suffer more from ill usage than porcelain and glass, especially the finer kinds of such ware. A few practical suggestions on the best method of cleansing and preserving these fragile materials may be welcome.

One of the most important things is to "season" glass and china to sudden changes of temperature, so that they will remain sound after exposure to sudden heat and cold. This is best done by placing the articles in cold water, which must be brought gradually to the boiling point, and then allowed to cool slowly, taking several hours to do it. The commoner the materials, the more care in this respect is required. The very best glass and china is always well-seasoned, or "annealed," as the manufacturers say, before it is sold. If the wares are properly seasoned in this way, they may be washed in boiling water without fear of fracture, except in frosty weather, when, even with the best annealed wares, care must be taken not to place them in hot water. All china that has any gilding upon it must, on no account, be rubbed with a cloth of any kind, but merely rinsed, first in hot and afterward in cold water, and then left to drain till dry. If the gilding is very dull and requires polishing, it may now and then be rubbed with a soft wash leather and a little dry whiting; but this operation must not be repeated more than once a year, otherwise the gold will most certainly be rubbed off and the china spoiled. When the plates, etc., are put away in the china closet, pieces of paper should be placed between them to prevent scratches on the glaze or painting, as the bottom of all ware has little particles of sand adhering to it, picked up from the oven wherein it was glazed. The china closet should be in a dry condition, as a damp closet will soon tarnish the gilding of the best crockery.

In a common dinner service it is a great evil to make the plates too hot, as it invariably cracks the glass on the surface, if not the plate itself. We all know the result — it comes apart; "nobody broke it," "it was cracked before," or "cracked a long time ago." The fact is, that when the glass is injured, every time the "things" are washed the water gets to the interior, swells the porous clay, and makes the whole fabric rotten. In this condition they will also absorb grease; and when exposed to further heat, the grease makes the dishes brown and discolored. If an old, ill-used dish be made very

hot indeed, a teaspoonful of fat will be seen to exude from the minute fissures upon the surface. These latter remarks apply more particularly to common wares.

As a rule, warm water and a soft cloth are all that is required to keep glass in a good condition; but water bottles and wine decanters, in order to keep them bright, must be rinsed out with a little muriatic acid, which is the best substance for removing the "fur" that collects in them. This acid is far better than ashes, sand or shot; for the ashes and sand scratch the glass, and if any shot is left by accident, the lead is poisonous. Richly cut glass must be cleansed and polished with a soft brush, upon which a very little fine chalk or whiting is put; by this means the lustre and brilliancy are preserved.—*Boston Journal of Chemistry.*

KID SKINS.

In certain parts of Europe the rearing of kids for the sale of their skins is an important business; those which command the highest prices, and are regarded as superior to all other, being the French, called in the market *peaux nationales.* By some the fine quality of these skins is attributed to a peculiar virtue in the wild vines upon which the young ones feed in the pasturage which they frequent; this, however, being a popular error, as their value is simply the result of the care with which the little animals are reared during their life of four or five weeks. They are not allowed to roam at large, as such a license would imperil the eveness of their skins, which would become scratched by rubbing against stones, or passing through hedges. They are. besides, deprived of all food except milk, as eating grass would tend to render their skins coarse. Consequently, they are kept under a wicket coop, from which, at regular hours, they are led to suckle the mother, and this continues until they are killed, at the end of four or five weeks. The younger they are killed the thinner the skin; but, of course, the smaller they are the less valuable, too, especially when they are only large enough to allow of single-buttoned gloves, while the demand is all for two, three and four-buttoned gloves. By rearing the kids in the manner just described, larger skins are obtained, which are as fine and delicate as those of younger ones of other countries where they roam at liberty. As France produces the best skins, so Paris excels all places in France where gloves are manufactured, and an adept in the trade can select a Paris-made glove from among hundreds made elsewhere.

KID GLOVES.

A French correspondent writes:

"The largest manufacturer for this country is Alexandre, who supplies one house in New York with between sixty and seventy thousand dozen pairs of kid gloves per annum. His principal factory for cutting is in Paris. Mr. Muller, who stamps his given name of Alexandre upon the gloves, when first known to Mr. Stewart was in humble circumstances, needing capital to enlarge his industry; but his merit being discovered, the want was supplied, and an enormous establishment is the result. Mr. Muller owns a hotel in Paris, for a winter residence, and possesses La Grange, with its sixty bedrooms and fifteen hundred acres of land, distinguished in former years as the home of Lafayette. His hospital-

ity corresponds with these important dwellings. He manufactures his own champagne, claret, brandy, etc., each of a fine quality.

"On a visit to me some years ago, he gave me the history of this manufacture. The opinion was then quite common that rat skins were used, which he disposed of very summarily. 'Besides other objections,' said he, 'it is enough to mention that they would be much too short for the hand.' In order to purchase kid skins, he sends out his agents as early as February to Italy, and they follow the mountain ranges, keeping pace with the opening of Spring, until they reach to the plains of the Baltic. Fields which will carry sheep, are not used for the goat in flocks. The goat is driven up to nearly the snow line of mountains, to feed on the tender branches of shrubs and trees, and they are tended and milked by a class which is not seen in this country.

"In walking up the Alps, I have found these interesting flocks. The horns of the animal supply handles for knives, its hair is used for cloth, its milk for cheese, its flesh for food — that of the young kid being excellent — and the skin is displayed on fair hands in all civilized countries. It will be years before this entire industry will be introduced into the United States.

"The compensation for sewing is too small to enlist the regular and permanent industry of women, and it is resorted to somewhat as knitting by hand is among us, at intervals of ordinary labor. The movement of the needle is guided by the notches of a steel clamp held by the sewer, who presently arrives at the experience which permits the work to be done while conversation is engaging part of the attention, and indeed while the eye is directed to a different quarter. It is owing to this facility that a slight reward for the labor is exacted. The sewers are distributed all over France, and receive the material, cut out with precision, and put up in bundles of a dozen pairs.

"In order to conduct the distribution of the gloves here with advantage, their form, color and shade, are fixed upon here. Colors which were in demand a year ago, are rejected now, and others have taken their place. The closest attention to the probable variations in the public taste must be observed. You would be surprised to see the sample-book shades furnished for the purpose of preparing orders. They represent every tint which our knowledge of nature and art supplies."

NEW USE FOR ALCOHOL.

A new and wonderful application of alcohol has recently been made in the treatment of tumors and cancer. Schwalbe, of Weinbeim, reports one hundred cases of various forms of indolent glandular swellings treated successfully by the subcutaneous injection of the tincture of iodine. Latterly he has used injections of simple alcohol in fifty similar cases, and has found the results equally favorable, and the time required for a cure no greater; and he, therefore, concludes that the alcohol is the essential remedial agent. He explains its curative action as follows: It establishes a state of chronic inflammation of the connective tissue, causing it to contract by degrees, and thus pressure is brought upon the vessels and the lymphatics are obliterated. These effects, and the consequent hardening of the connective tissue, he proposes to utilize in the

treatment of other tumors, and he reports the cure of fatty tumors by the use of such injections, to which some ether was added in order to dissolve the fat. He finds, however, the most important application of his plan in the treatment of cancer by preventing its extension to the neighboring tissues and lymphatic gland. The tumor is first to be isolated, as it were, by causing the connective tissue on all sides of it to become shriveled. Then the contractive connective tissue, approaching the growth itself, presses upon it, cuts off its blood supply, and so causes it to disappear by atrophy. Lymphatic glands which are already affected are to be similarly treated. Schwalbe, with Dr. Hasse, claims to have cured three cases of cancer of the breast in this way.

WEIGHT OF THE SEXES.

On the average, boys at birth weigh a little more, and girls a little less than six pounds and a half. For the first twelve years the two sexes continue nearly equal in weight, but beyond that time males have a decided preponderance. Thus the young men of twenty average 143 pounds each, while the young women of twenty average 120 pounds. Men reach heaviest bulk at about thirty-five, when they average about 152 pounds; then they slowly increase in weight until fifty, when their average is about 168 pounds. Taking men and women together, their weight at full growth averages about twenty times as heavy as they were on the first day of existence. Men range from 108 to 220 pounds and women from 88 to 207. The actual weight of human nature, taking the average of ages and conditions — nobles, clergy, printers, maidens, boys, girls and babies, all included — is very nearly 100 pounds. These figures are given in avoirdupois weight; but the advocates of the superiority of women might make a nice point by introducing the rule that women be weighed by Troy weight — like other jewels — and men by avoirdupois. The figures would then stand: young men of twenty 143 pounds each; young women of twenty 160 pounds each, and so on.

THE BREMEN ROSE-WEIN.

A writer gives an estimate of the value of the famous Bremen rose-wein, which, in the year 1624, cost $165 per cask, and is now two hundred and fifty-two years old. Calculating the original outlay at ten per cent. compound interest, he states that in 1865 the value of each cask was $231,883,905,000, or nearly ninety times the present debt of the United States, while each bottle was worth $161,039,499, very nearly the sum realized from duties on imports in the United States last year. Each glass was worth $20,000,000, and each drop $20,000. We should think this wine had been kept almost too long, and the owners had better "realize" soon, unless they want to lose on it.

EMBROIDERING BY MACHINERY.

In the early history of almost every manufacture there is nearly always an amount of almost romantic interest that no outsiders would expect from seeing its humdrum or every day working. This is the case with the recent and comparative new art of embroidering by machinery. In 1827-8 a certain M. Heymann, of Mulhouse, introduced into Switzerland a machine for producing sewing or long-stitch

embroidery work. A St. Gall merchant advanced sufficient funds for making ten or a dozen such machines; and after the usual changes and improvements, very fair results were obtained. Forty-odd years, ago, however, an aversion to labor-saving machinery, even amongst comparatively well educated people, was one of the economical fallacies of the time. It was difficult to obtain labor, and many people conspired to impede the employment of the machines and their products. In the end, the St. Gall capitalist lost all his fortune, becoming a bankrupt, while the machinery was taken to pieces and thrown into a heap.

Not less than twenty years later a nephew of this same Swiss merchant conceived the idea of sorting these pieces, and erecting them according to the dim memories of his childhood. After considerable trouble he at last succeeded. With much shrewdness he kept his undertaking secret, sending the embroidered work to foreign markets as hand-made embroidery. By his ability and good fortune he rapidly prospered, gradually increasing the number of his machines, but keeping their construction secret, as patents are not granted in Switzerland. At last his success attracted attention. Others wished to embark in such a prosperous trade; the difficulty consisted in procuring machinery. The successful manufacturer was naturally not desirous of competition; and, in the meantime, the machine shop where the first machines had been made for M. Heymann had passed into other hands, the new people knowing nothing about it. At last, after turning their drawing office upside down, some of the detail drawings were fished up; and with the aid of these the construction of a machine was begun. Slowly and with much difficulty, the missing parts were bit by bit added, and the first machine was satisfactorily got to work. This proved a fortune for the machine shop. Orders for these machines flowed in, the factory was enlarged, but still could not keep pace with the demand; other shops sprang up for making them, and also got full of work. It is now estimated that there are about five thousand machines of the kind in actual work for the St. Gall market, making nothing but *"bandes"* and *"entredeux,"* while many hundreds more of such machines are erected every year. On an average each machine works three hundred or more needles, which will give an idea of the power of production. This branch of manufacture has, in fact, now grown up into one of the main staples of St. Gall. Chain-stitch embroidery, estimated to be five or six times as important, is still almost exclusively made by hand; and manufacturers are eagerly waiting for a machine as good as that for long-stitch. The brilliant prospect has tempted many inventors; some have succeeded in making little machines with only one needle, but this is not a commercial machine.

SILK.

Raw silk is said to have been made by a people of China called Seres, 150, B. C. It was first brought from India A. D., 374, and a pound of it at that time was worth a pound of gold. The manufacture of raw silk was introduced into Europe from India by some monk in 550. Silk dresses were first worn in 1455. The eggs of the silk worm were first brought into Europe in 527.

SCISSORS.

The Scissors of Atropos were made like sheep-shears, the bowsprings at the junction of the bladed handles. Fosbroke says that *forfices* were thus made and were common among the Britons and Anglo-Saxons. The blades with loops for the fingers and pivoted together by rivet is of later date. Isidore in the fifth century refers to them as the tools of the barber and tailor. In an ancient tomb lately opened in Egypt were found a pair of bronze scissors lying in a lady's work-basket. The handles were formed in the shape of a sphinx. The basket contained needles, pins, combs and many articles of the toilet and work-basket.

EXERCISE IN PRONUNCIATION.

The following rather curious piece of composition was recently placed upon the blackboard at a teacher's institute, and a prize of a Webster's dictionary offered to any person who could read and pronounce every word correctly. The book was not carried off, however, and 12 was the lowest number of mistakes in pronunciation made: "A sacrilegious son of Belial, who suffered from bronchitis, having exhausted his finances, in order to make good the deficit, resolved to ally himself to a comely, lenient and docile young lady of the Malay or Caucasian race. He accordingly purchased a calliope and coral necklace of a chameleon hue, and secured a suite of rooms at a principal hotel, he engaged the head-waiter as a coajutor. He then dispatched a letter of the most unexceptional caligraphy extant, inviting the young lady to a matinee. She revolted at the idea, refused to consider herself sacrificable to his desires, and sent a polite note of refusal; on receiving which he procured a carbine and bowie knife, said that he would not now forge letters hymeneal with the queen, went to an isolated spot, severed his jugular vein, and discharged the contents of the carbine into his abdomen. The debris were removed by the coroner.

SULPHURIC ACID.

One of the most important products of chemical science is sulphuric acid, or oil of vitriol. It is a very important element in connection with the development of leading industries, and by various combinations forms soda, hydrochloric acid, nitric acid, and super-phosphates for fertilizing purposes. It is also a primary constituent in substances used for making soap, glass, paper, and for bleaching and dyeing. It is by the aid of sulphuric acid that we clean plates and gild metals, purify oils and manufacture candles.

It was not until within the last century that the benefits of this sour corrosive liquid were fairly appreciated. One hundred years since many of the great manufacturing industries of the present day were only in their infancy, and the quantity of sulphuric acid consumed in the whole of Europe at that time did not reach over about twenty thousand tons, the supply being obtained by burning, at the top of large leaden chambers, the native sulphur obtained from the volcanic ground of Sicily and one or two other regions of like character. Now the magnitude of the world's enterprises demands a corresponding consumption of this potent agent of civilization, and the comforts and advantages enjoyed by all people attest the efficacy

of this staple chemical product. It is stated on good authority that the quantity of sulphuric acid annually used in Europe is more than eight hundred thousand tons, and two hundred and fifty millions of kilogrammes of sulphur are employed in its manufacture. Sulphuric acid is also largely manufactured in Brooklyn from sulphur, but of late years iron pyrites have been substituted to a considerable extent. The strength and purity of the two preparations are about the same, and their effectiveness in each case about as thorough. Sulphuric acid made from sulphur is an equivalent of sulphur combined with three equivalents of oxygen.

Experiments were made in France as early as 1793 to manufacture sulphuric acid from iron pyrites, but without marked success. After repeated attempts of this character by several chemists in various countries, it was reserved for the efforts of M. M. Perret, to be crowned with signal success in 1830, and since that time the knowledge of this manufacture extended throughout the civilized world. In Europe almost the entire production of sulphuric acid is made from pyrites, and very little is manufactured from the volcanic or common sulphur. The difference in cheapness of material is decidedly in favor of the former mineral.

"SIR-LOIN."

THE sirloin of beef is said to owe its name to King Charles the Second, who dining upon a loin of beef, and being pleased with it, asked the name of the joint. On being told, he said: "For its merit, then, I will knight it, and henceforth it shall be called Sir-Loin."

THE HUGE TREES OF THE WORLD.

One-third of the land surface of our globe is covered with forests. The largest tree in the world is situated near Muscoli, at the foot of Mount Ætna, and is called "The Chestnut Tree of a Hundred Horses," believed to be the oldest tree in the world. Its name arose from the report that Queen Jane of Aragon, with her principal nobility, took refuge from a violent storm under its branches. At one time it was supposed that it consisted of a clump of several trees united. But on digging away the earth, the root was found entire, and at no great depth. Five enormous branches rise from the trunk 204 feet in circumference, the intervals between which are of various extent, one of them being sufficient to allow the carriages to drive abreast. A fig tree stands on the northerly bank of the river Johnstone, in East Australia, latitude 27 degrees, longitude 151 degrees, near Brisbane, measuring three feet from the ground one hundred and fifty feet, where it sends off great branches, eighty feet in circumference. In Buoyouderch, near Constantinople, is a plane tree measuring one hundred and forty-nine feet in circumference. The "Giant Redwood Tree," in Nevada, latitude 38 degrees, longitude 129 degrees, is one hundred and nineteen feet in circumference. There are thirteen other trees standing near it, measures from seventy-two to ninety-six feet in circumference. In Oaxaca there is a cypress tree measuring one hundred and seventeen feet in circumference. The "Grizzly Giant," the monarch of the Mariposa Grove, measuring ninety-two feet in circumference. The Tulare Fresno Forest, so called from its being situated in those two

counties (California), extending seventy miles in length, with a width in some places of ten miles, consists mainly of big trees, with a multitude of smaller ones, measuring from six to one hundred feet in circumference. In 1852, John Dowd discovered in Calaveras county, Cal., a grove of one hundred and three trees, covering a space of fifty acres, measuring from seventy to ninety feet in circumference. There is an elm tree in the south of England which measures sixty-one feet in circumference. In Norfolkshire there is a famous lime tree measuring forty-eight feet in circumference. On the Hubbard farm, in North Andover, stands a magnificent elm tree, measuring twenty-seven feet in circumference. A barberry bush has taken root in a notch thirty feet from the ground, which can be recollected by some of the oldest inhabitants during their boyhood. At Hingham, near the Old Colony House, is an elm tree measuring twenty-six feet in circumference. The Washington elm, in Cambridge, measures twenty-five feet, and the big elm on Boston Common measures twenty-four feet in circumference.

A CHEAP ELECTRIC BATTERY.

The smallest, cheapest and most effectual battery is the one by Dr. Golding Bird, of England. Procure the bowls of six tobacco pipes, and stop up the holes left by breaking off the stems with sealing wax; next get six small tumblers of about an inch in height, such as children use for toys; place in each a cylinder of amalgamated zinc, put a pipe bowl in each cylinder, and in each pipe bowl a thin slip of platinum foil, one inch and a quarter long and half an inch wide, connected at the zinc cylinder by a platinum wire; fill the pipe bowls with nitric acid, the tumblers with dilute sulphuric acid, and an energetic current will be evolved, capable of decomposing water, igniting wire, charcoal points, etc.

IMPORTANT DISCOVERIES.

The Stereoscope was invented by Prof. Wheatstone, and first described by him in 1838. It was only a year after this that M. Daguerre made known his discovery in Paris; and almost at the same time Mr. Fox Talbot sent his communication to the Royal Society, giving an account of his method of obtaining pictures on paper by the action of light. Iodine was discovered in 1811, bromine in 1826, chloroform in 1831, gun-cotton, from which collodion is made, in 1846, the electro-plating process about the same time with photography; "all things, great and small, working together to produce what seemed at first as delightful but as fabulous as Aladdin's ring, which is now as little suggestive of surprise as our daily bread."

PIANO WOODS.

In an ordinary piano there are fifteen kinds of wood, namely: Pine, maple, spruce, cherry, walnut, whitewood, apple, basswood, birch, mahogany, ebony, holly, cedar, beech and rosewood, from Honduras, Ceylon, England and South America. There are used of the metals, iron, steel, brass, white metal, gun metal and lead. There are in an instrument of seven and a half octaves two hundred and fourteen strings, making a total length of seven hundred and eighty-seven feet. Such a piano will weigh from six hundred to one thousand pounds.

INVENTION OF PUNCTUATION.

Punctuation is peculiar to the modern languages of Europe. It was wholly unknown to the Greeks and Romans, and the languages of the East, although they have certain marks and signs to indicate tones, have no regular system of punctuation. The Romans and Greeks also, it is true, had certain points, which like those of the languages of the East, were confined to the delivery and pronunciation of words; but the pauses were indicated by breaking up the written matter into lines or paragraphs, not by marks resembling those in the modern system of punctuation. Hence, in the responses of the ancient oracles, which were generally written down by the priests and delivered to the inquirers, an ambiguity—doubtless intentional—which the want of punctuation caused, saved the credit of the oracle, whether the accepted event was favorable or unfavorable. As an instance may be cited that remarkable response which was given on a a well known occasion, when the oracle was consulted with regard to the success of a military expedition : "*Ibis et redibis nunquam peribis in bello.*"

Written, as it was, without being pointed, it might be translated either, "Thou shalt go, and shalt never return, "Thou shalt perish in battle," or, "Thou shalt go and shalt return, thou shalt never perish in battle." The correct translation depends on the placing of a comma after the word *nunquam* or after *redibis*. The invention of the modern system of punctuation has been attributed to the Alexandrian grammarian, Aristophanes, after whom it was improved by succeeding grammarians; but it was so entirely lost in the time of Charlemagne that he found it necessary to have it restored by Wamfried and Alcuin. It consisted at first of only one point, used in three ways, and sometimes of a stroke formed in several ways. But as no particular rules were followed in the use of these signs, punctuation was exceedingly uncertain until the fifteenth century, when the learned Venetian pointers, the Mantuii, increased the number of signs and established some fixed rules for their application. These were so generally adopted that we consider the Mantuii as the inventors of the present method of punctuation; and although modern grammarians have introduced some improvements, nothing but a few particular rules have been added since their time.

AN INCH OF RAIN.

Few people can form a definite idea of what is involved in the expression, An inch of rain. It may aid such to follow this calculation: An acre is equal to 6,272,640 square inches; an inch deep of water on this area will be as many cubic inches of water, which at 227,274 to the gallon, is 22,622.5 gallons. This quantity weighs 226,225 pounds, or 100.93 tons. One-hundredth of an inch (0.01) is equal to one ton per acre.

MANUFACTURE OF CLAY TOBACCO PIPES.

The clay of which these are made is obtained in Devonshire, in large lumps, which are purified by dissolving in water in large pits, where the solution is well stirred up, by which the stones and coarse matter are deposited; the clayey solution, is then poured off into another, where it subsides, and deposits the clay. The water, when clear, is drawn off, and the clay at the bottom is left sufficiently dry for use.

Thus prepared, the clay is spread on a board, and beaten with an iron bar to temper and mix it ; then it is divided into pieces of the proper size to form a tobacco pipe ; each of these pieces is rolled under the hand into a long roll, with a bulb at one end to form the bowl ; and in this state they are laid up in parcels for a day or two, until they become sufficiently dry for pressing, which is the next process, and is conducted in the following manner : The roll of clay is put between two iron moulds, each of which is impressed with the figure of one-half of the pipe ; before these are brought together a piece of wire of the size of the bore is inserted midway between them ; they are then forced together in a press by means of a screw upon a bench. A lever is next depressed by which a tool enters the bulb at the end, and compresses it into the form of a bowl ; and the wire in the pipe is afterward thrust backwards and forwards to carry the tube perfectly through into the bowl. The press is now opened by turning back the screw, and the mould taken out. A knife is next thrust into a cleft of the mould left for the purpose, to cut the end of the bowl smooth and flat ; the wire is carefully withdrawn, and the pipe taken out of the mould. The pipes when so far completed, are laid by two or three days properly arranged, to let the air have access to all their parts, till they become stiff, when they are dressed with scrapers to take off the impressions of the joints of the moulds ; they are afterwards smoothed and polished with a piece of hard wood.

The next process is that of baking or burning ; and this is performed in a furnace of peculiar construction. It is built within a cylinder of brickwork, having a dome at top, and a chimney rising from it to a considerable hight, to promote the draft. Within this is a lining of fire-brick. having a fire-place at the bottom of it. The pot which contains the pipes is formed of broken pieces of pipes cemented together by fresh clay, and hardened by burning ; it has a number of vertical flues surrounding it, conducting the flame from the fire-grate up to the dome, and through a hole in the dome into the chimney. Within the pot several projecting rings are made ; and upon these the bowls of the pipes are supported, the ends resting upon circular pieces of pottery, which stand on small loose pillars rising up in the center. By this arrangement a small pot or crucible can be made to contain fifty gross of pipes without the risk of damaging any of them. The pipes are put into the pot at one side, when the crucible is open ; but when filled, this orifice is made up with broken pipes and fresh clay. At first the fire is but gentle, but it is increased by degrees to the proper temperature, and so continued for seven or eight hours, when it is damped and suffered to cool gradually ; and, when cold, the pipes are taken out ready for sale.

HOW COUNTERFEIT NOTES ARE MADE.

A party of men, say from three to a dozen, get together and hold frequent meetings, and act according to a plan laid down. One or two will find out some copper plate printer in the employ of the bank note company — in fact, all such printers are known by the party. These men will then manage to meet one of the printers in the evening, get acquainted, drink, and

have a good time generally with him, and so proceed for a few evenings. Then they offer him from $50 to $100 to procure a certain kind of impression. This impression is made in this wise: The printer will take the impression on tin foil from the plate from which he is printing, which can be done in a moment. Thus you see every line and the size is obtained correctly. From this tin foil an electrotype plate is made. They then get some plate printer who can be found about the city, have a good time with him, and engage him at twenty dollars a day to do the printing. By this plan, thousands of copies are struck off that defy detection except in the quality of the paper, which will differ from the genuine. The place of manufacture is generally at some distance from New York, like Staten Island, Flatbush, or some similar locality in that city. It is a strange fact, in every case where a party of this kind exists, that every member lacks confidence in his associates. Every move made by one is narrowly watched by others of the party. It would be death to an informant or spy that did not look well to himself.

METHOD OF TAKING IMPRESSIONS OF MEDALS OR COINS.

The following is a method of taking impressions of medals or coins with isinglass. Take an ounce of isinglass, heat it in a mortar; then pick it into small pieces, put them into a half-pint phial, and then fill it up with a spirituous liquor (common brandy or Geneva will do); put a cork into the phial, with a notch cut in one side of it for a passage of air, and then set it by the fire three or four hours, shaking it often in that time; (the heat should be great enough to keep it near the boiling point all the while). The isinglass will then be sufficiently dissolved, and the whole must be put into a cloth and strained off; it must finally be put into a clean phial, well corked, and kept for use.

When it is wanted for use, take the glue and set it by the fire, and it will soon liquify, or become fluid; then, having made the medal clean, and placed it quite level, pour on as much of the glue as will cover it completely over and lie without running off. It must then be let stand to dry (which, in the Summer time and dry weather, will be but one or two days); when quite dry, it must be taken off by entering the point of a penknife under one side, and it will rise off the medal in clear, transparent and perfect resemblance of the whole, and even the most minute parts of it.

STRADIVARIUS AND HIS VIOLINS.

In the year 1644 there was born in the Italian town of Cremona a child whose name is famous as that of the greatest maker of violins that ever lived. Little is known about Antonius Stradivarius except that he reached the great age of ninety-three, and worked at his art until shortly before his death. In fact, there is one of his instruments in existence bearing a certificate in his own hand-writing with the date 1736, when he was ninety-two years old. He was a pupil of Nicolas Amati, a member of a family that for nearly two hundred years had been distinguished for skill in the manufacture of violins, and had made the name of Cremona synonymous with the highest excellence in their profession.

Several instruments made by Andreas Amati, the first maker of the name, for

Charles IX. of France, were long kept in the Chapel Royal at Versailles, but they disappeared during the stormy days of the great Revolution, and only two of them were ever recovered. One of these, a violincello with a tone of extraordinary power and richness, was sold at auction at London in May, 1827. It bore the maker's name and residence in Latin, and the catalogue said that the proprietor received a document, when he purchased it, stating that it was presented to Charles IX. by Pope Pius V.

Skill in the manufacture of violins was hereditary in the Amatis, for the talent of Anpreas, which was shared by his brother Nicolas, was possessed also by his sons, Antonius and Hieronymus, who made some famous ones for Henry IV. of France. But the most celebrated maker in the family was Nicholas Amati, the son of Hieronymus, who, while following the models of his ancestors, produced better proportioned and more finished instruments. Those of the large or grand pattern are equal in power and sweetness of tone to most of the violins of Stradivarius. The genius of the Amatis declined with Nicolas, for his son, who is considered the last of his family, was inferior to his predecessors, and made but few instruments. As late as 178–, however, a descendant of the celebrated makers worked in an establishment at Orleans, where his violins were much admired. His varnish of rich golden amber, so characteristic of the Amatis, attracted much attention, but he refused to disclose its nature, saying that it was a family secret, and he left Orleans rather than divulge it.

Contemporary with Andreas, the eldest Amati, was Gasper di Salo, a still more noted maker, who worked at Brescia from about 1560 to 1610, or a little later. His productions, though not highly finished are remarkable for their clear and vigorous tone. Dragonetti, the celebrated double-bass player, used one of his instruments, and among the violins of the great makers owned by Ole Bull, his favorite is by this master.

Stradivarius was the worthy pupil of the greatest of the Amatis, and his old Cremonas have brought the most extravagant prices. There is, however, considerable difference in their quality, the best having been made between 1700 and 1725, his hand retaining its cunning till past fourscore. After that time his instruments were less perfect, and it is probable that his two sons, who were among his assistants, did more of the work than formerly, though still under his directions. At his death he left several unfinished instruments, which were completed by his sons, who placed his ticket in them, so that some doubt exists as to the authenticity of those made during his closing years. There are undoubtedly numerous counterfeits bearing his name, for although he made a good many instruments during his long life, genuine ones are scarce. The taste and skill displayed in his model have never been surpassed. The wood united beauty with great capability for conducting sound; the tone of the strings were of remarkable excellence, and the varnish was of a beautiful warm reddish or yellowish color, the secret of which is lost.

The increase in the value of instruments made by Stradivarius since his death is very remarkable. His usual price for a violin was about eighty francs. A similar instrument to-day would bring from eight hundred to two thousand dollars, according to its

state of preservation, while his violincellos command a much larger sum. The highest price ever paid for a violin, according to Sandy's and Forester's works on the subject, was given for one made by Stradivarius, which was sold in 1856 for more than its weight in gold. One of the finest instruments — which derived an additional value from its having belonged to the celebrated violionist, Viotti — was sold at auction in Paris in 1824 for thirty-eight hundred francs. These prices furnish a striking commentary on the experience of the elder Cervetto, who, before he became a musician, was an Italian merchant, and had dealt with Stradivarius himself in musical instruments. Some of the productions of the master he carried to England, but being unable to obtain as much as *five* pounds for a violincello, the disappointed dealer sent them back as a bad speculation. A century passed away, and at an auction in London in 1827 of the musical instruments of Sir William Curtis, the well known connoisseur, a violincello of Stradivarius was put up at two hundred guineas, and bought in for two hundred and thirty-five. It bore the date 1684, and was said to have been made for a Corfiote nobleman, who placed it in a chest with cotton, where it remained for more than a century.

VIOLIN AND ZITHER MAKERS.

In the quaint little Bavarian village of Mittenwald nearly 8,000 violins are made every year for export to all parts of the world. The manufacture has flourished there for the last 200 years. The inhabitants work in their own homes, as will be seen by the sketch. The workmen are about 200 in number, and receive very scanty pay for their labor. As short a time back as eighty years, the only agent they had was an old man, who went about from place to place with a box on his back containing specimens of their work. Most of them only do the fiddle work in Winter, as they are generally occupied in the Summer in getting in their little bit of corn, hay, etc. A boy can learn the trade without any pecuniary assistance on the part of his parents, as the Bavarian government started a school for violin making some years ago. There is also a drawing school and a music school, free to all who choose to join. They make some wonderful imitations of violins, such as those of Antonius Stradivarius, Cremona, "faciebat Anno 16—;" Guiseppe Guarnerius, "✠ fecit Cremona 16—, I. H. S.;" Nicolaus Amalus Cremonien, Hieronimy, fili Antoni 16, and many more. These are sold in Mittenwald as imitations, but are often passed off by others as originals. All kinds of stringed instruments are made in this romantic village.

The zither is one of the sweetest and most touching of instruments. It is unique! Of these parts it is a native; but it is only within the last forty years that it has reached its present completeness. Zithers have been made in Mittenwald for the last 100 years; and, strange to say, all zither makers of note who have established themselves in Munich, Vienna and other large cities, have either been born in Mittenwald or have learned their trade there. Most of the peasants can play the zither a little (play a "Landler" or a waltz.") In Russia it is very popular, and some of the best German zither players are there at the present. In this country it is also getting well known. It has too

little power for a large concert room, but it is well suited to parlor entertainments.

CREMONA VIOLINS.

Dr. Lee, who was lecturer in St. Thomas' Hospital, London, and an accomplished amateur performer on the violin, entertained a great passion for the instruments themselves, and made hundreds of experiments to find out the cause of the superiority of tone in the Cremona. He had a fine Cremona taken to pieces, and a number of new instruments made in every part exactly like it, and yet none of them equalled it in tone. He thus found out that it was not a particular form which gave these instruments a superiority over all others. He then experimented with various kinds of wood, and also treated the same sort of wood in various ways, in order to discover if this was the cause. For example, he steeped some in alcohol, others in oil, then dried them, and had them made of the genuine Cremona shape. All these efforts however, were vain; the old Cremona sung sweetly over them all. At last it struck him that there might be something in the varnish connected with the subject, and he discovered that *amber* varnish was the coating of old Cremo. To work at varnishes he then went, (for he was a determined experimenter and a good chemist,) and at last he made a grand hit. By making amber varnish in the same way that copal varnish is made, namely, by heating the amber, then pouring hot oil upon it, he obtained a varnish which, when applied to his violins, improved their tones in a wonderful manner. This varnish takes a long time to become perfectly dry. The violins to which it is applied have to be hung up in the open air for months before they lose their tacky character, but when perfectly dry it is the grand solvent of the Cremona's superiority. Severia, the famous violinist, and pupil of Paganini, was presented with one of Dr. Lee's violins, and he declared it was equal to a Cremona; of twenty violins in his possession it was excelled only by one, while it was superior to all the others.

CELLULOID — A SUBSTITUTE FOR IVORY.

A substitute under the name of celluloid, the invention of Mr. Hyatt, of Albany, originally intended as a substitute for ivory in the manufacture of billiard balls, possesses qualities which render it applicable to a great variety of manufactures. As originally prepared it consisted of a combination of soluble cotton and ether or alcohol, but it was subsequently ascertained that a still more satisfactory result could be obtained by the addition of camphor to the alcohol; and finally, camphor alone was mixed with the ground cotton pulp, which hardens in drying and becomes "celluloid." This substance — which is maintained by the inventor to be a truly chemical compound and not a mechanical mixture — can be colored in any way desired. The varying degrees of solidity and flexibility required are obtained by the different proportions of the camphor. The substance is naturally of a pale amber color, but may be made of any tint by the application of mineral pigments or dyes soluble in alcohol, or any of the aniline colors may be employed.

Celluloid is hard and elastic, ranging in hardness from that of iron to ivory. It is as tough as whalebone, elasticity

being one of the most prominent characteristics. It makes good insulators for knobs of telegraphic instruments, for insulating posts for electrical machines, and for telegraphic wires; as although a good non-conductor it is not perceptibly electric. It is well adapted to the manufacture of combs, and is largely used in the preparation of dental plates, as it can be made of precisely the color of the palate and gums. At a temperature of two hundred and fifty to three hundred degrees it can be moulded to any desired form. Several companies have been started for the manufacture of different objects from celluloid; two in Newark, and several others in Philadelphia, New York, and elsewhere.

COLOR BLINDNESS.

A brakesman has been discovered in Sedalia who "cannot see any difference between the color of a red lantern and a green." This suggests the question whether it would not be well to test the ability of all persons—such as railway employees and seamen who are to be employed in signaling, to distinguish colors; for it is a curious fact that many of those who are color blind are entirely unconscious of their infirmity; moreover one of the commonest forms of this abnormal condition of the eye is an inability to distinguish between red and green, two primary colors very generally used in signaling. And although such a marked case as the one cited is comparatively rare, the fact that the defect does exist, suggests a possibility of accident which can be easily guarded against.

Attention was first directed to this subject of color-blindness by Dr. John Dalton, an English chemist of note, who in a paper published in 1794, gave an account of a strange defect in his vision which rendered him incapable of distinguishing any difference between such colors as red, green, blue and purple. He attributed this peculiarity to the presence of colored fluids in the eye, but recent investigations demonstrate that this affection is due not so much to a malformation or lack of sensibility in the eye as to a want of that perceptive faculty in the mind, which we call color; and there is one instance known of a person who was not only unable to say what objects were green, or red, or blue, but to whom all colors were but so many degrees of shade, the whole face of nature being represented by blacks and greys and white.

It is extraordinary that while Dr. Dalton's case is the first one of which we have any record, persons afflicted with color-blindness (or "daltonism" as it is sometimes called,) in a lesser degree, are quite common among us.

Dealers in worsteds and zephyrs say that it is not unusual for ladies desiring to "match patterns" themselves, to fail to distinguish the shades in greys and neutral tints, and to confound the paler hues of pink with lilac, olive with brown, etc.

A remarkable illustration of one form of color-blindness was given some months ago in London. Several of the later pictures of Turner were exhibited, at first under ordinary daylight, and afterwards with a strong yellow light thrown upon them; by this latter process all the colors in the picture were improved and a more natural effect was given; thus showing that as the artist advanced in years his perception of one color increased, and he saw his painting as it were through yellow spectacles.

The natives of India have a wonderful faculty of readily distinguishing difference in color so slight as to be absolutely invisible to the European eye; the gradations of color in some of their dyes exceeding ours by many hundreds of shades.

All of us who are not afflicted with this affection know how necessary it is, in order to produce rich effects in furnishing our apartments, to use well contrasted colors; but it is not so generally known that the most perfect contrasts are produced by colors which are complementary, that is to say, those colors which if blended together would produce white. These complements can always be discovered by this very simple process: make a disc, say two inches in diameter, of the color of which you desire the complement, place it upon a sheet of white paper in a strong light and look steadily at it for a few moments, then quickly remove the disc and you see in its place another disc of the desired color. It is also well to remember in selecting wall-papers or carpets, that after looking at such bright hues as red, blue, etc., for some time they seem to lose their brilliancy, whereas a green seen beside a red, or any two complementary colors in juxtaposition, appear much brighter than when seen apart.

CHECKED PERSPIRATION.

There are two kinds of perspiration, *sensible* and *insensible*. When we see drops of water on the surface of the body as the result of exercise or subsidence of fever, that is *sensible perspiration*, perspiration recognized by the sense of sight. But when perspiration is so gentle that it cannot be detected in the shape of water drops, when no moisture can be felt, when it is known to us only by a certain softness of the skin, that is *insensible* perspiration, and is so gentle that it may be checked to a very considerable extent without special injury. But, to use popular language, which cannot be mistaken, when a man is sweating freely, and it is suddenly checked, and the sweat is not brought out again in a very few moments, sudden and painful sickness is a very certain result.

What, then, checks perspiration? A draft of air while we are at rest, after exercise, or getting the clothing wet and remaining at rest while it is so. Getting out of a warm bed and going to an open window or door has been the death of multitudes.

A lady heard the cry of fire at midnight; it was bitter cold; it was so near the flames illuminated her chamber. She left the bed, hoisted the window, the cold chilled her in a moment. From that hour until her death, a quarter of a century later, she never saw a well day.

A young lady went to her window in her night clothes to look at something in the street, leaning her unprotected arms on the stone window-sill, which was damp and cold. She became an invalid, and will remain so for life.

Sir Thomas Colby being in a profuse sweat one night, happened to remember that he had left the key of his wine cellar on the parlor table, and, fearing his servants might improve the inadvertence and drink some of his wine, he left his bed, walked down stairs; the sweating process was checked, from which he died in a few days, leaving six millions of dollars in English funds. His illness was so brief and violent that he had no opportunity to make his will, and his immense property was divided among five or six day-laborers who were his nearest relatives.

The great practical lesson which we wish to impress upon the mind of the reader is this: When you are perspiring freely, *keep in motion* until you get to a good fire, or to some place where you are perfectly sheltered from any draft of air whatever.

THE CURIOUS WAYS OF PLANTS.

Who can account for the ways of plants, or explain why a certain species will grow in one place and will not in another exactly similar, so far as human intelligence can determine?

The American aloe is a hundred years in getting ready to flower, whereas the gourd grows like Jack's bean-stalk. Some wild flowers disappear on the advance of civilization, while on the other hand the plantain, if the truth is told, goes whereever Europeans go, and in this country was unknown until after the English came, following so closely on their tracks that the Indians gave it the name of "white man's foot."

Some varieties, as above intimated, may be found in a particular locality and nowhere else within half a dozen miles. There is, for example, in Central New England, one spot where are a few shrubs of the mountain laurel ("spoon wood") in a little patch by the roadside, and, although this would seem the natural country for it, it can be discovered in no other place anywhere about.

Then there is the fringed gentian, which has been seen beside a secluded road some six miles away; but with that exception, appears wholly unknown in the vicinity; yet the closed gentian is abundant. Another of the perverely disappointing flowers is the dog-tooth violet; not, however, more capricious than the yellow violet and the noble liverwort (*hepatica triloba*), which, in certain dry maple woods in the one case, and in open knoll-covered pastures in the other, grow in great abundance; still, one might search acres of similar woods and pastures for them, all to no purpose.

Another case, somewhat in point, is the holly—indigenous, or at least one variety, to moist woods along the eastern boarder of New England; but so partaking of the afore-named eccentricity, that he may count himself a happy man who can find it, and prove his success by great armfuls of it wherewith to deck his house at Christmas. One gets glimpses of it while riding through some swampy tract on Cape Ann, the bright berries and evergreen leaves, so suggestive of English good cheer, betraying it. There, too, in summer, by searching diligently, one may find a species of magnolia, that being about its northern limit.

No common New England flower is so little to be depended upon as the trailing arbutus. It is difficult to determine what it wants. It abounds in gravelly knolls by the wayside, and thrives on the very edge of pasture bogs, and in the shade of woods; and yet, with all this versatility, there are many towns where it is never found, and where, though transplanted and tended with care, it cannot be made to live.

Quite opposite, in these respects, is the "cardinal flower," whose home is by the water side, the only place where it grows naturally, although the kind of water is not of imminent consequence, for it will do just as

well in a dark nook under the upheaved roof of a willow, on the edge of a mill pond, in the muddiest ooze, as in the cleanest sand along a river's bank, its chief requirement seeming to be that it shall not be crowded—one stalk always standing by itself, independent of its kind and not in close neighborhood to other plants. It is so adaptive that it will bear removal to a garden, taking kindly to its new conditions; and there it will come up year after year, flaming out in live scarlet, in "one glorious blood red," as if nothing had happened to it.

There are other facts, more singular as to the ways of growth and "hows" of blooming. One can understand that a grape-vine may hold to its support by means of a tendril, while an ivy or a Virginia creeper secures itself by thrusting its rootlets into a crevice of a wall or in the bark of a tree; but why should a honeysuckle and a bean vine wind in opposite directions, the one going to the left and the other to the right? and either will swing in the wind or sprawl over the ground rather than turn the other way.

The ketmia opens at nine o'clock in the morning, and shuts at ten, as if it had a visual weakness; while a bed of Portulaccas never expand unless the sun is out; and the hotter he shines the wider they spread themselves; and the evening primrose waits until he has gone down, and then comes open with a snap, like a subdued kind of fire-cracker.

But most unaccountable of all, perhaps, is the night-blooming jasmin. You see a simple tree-like plant, with a plain style of leaf, at the base of which grows a spray of yellowish green tubes like lilac buds, suggesting, more than anything else, a string of small candles. You look at them in the middle of the day, and they are "only that and nothing more;" and you might, if you did not know their ways, forget all about them; but when evening comes, forgetting is impossible. The room is full of fragrance, rich as orange flowers, and almost as subtle as violets; and lo! your little candles are all lighted; and from somewhere about them comes that perfume which is so delicious and so mysterious as to its source. The next morning they begin to contract; by noon the five points are all close packed, and there is no scent to them or about them at all till night comes on again; and so they continue, scentless through daylight, but of exquisite sweetness when darkness appears.

"BULLS" AND "BEARS."

The meaning of these terms is not generally understood. The object of the Bull is to enhance prices, while the Bear fattens when prices fall, and all his energies are brought to bear to depress prices, that when down to the lowest ebb he may buy, and thrive upon the reaction which he expects will follow. The Bear delights in "panics," and financial troubles in general, because he gains by "the rise." No rise can occur except it be by a preceded tumble. The Bear keeps no stock on hand. His plan is to sell "short," and buy to fill his contract when prices are depressed, his contract contemplating a profit, by a fall below the price for which he has agreed to furnish.

Hence it is to the interest of the Bear to depress in every way he can, by false rumors. "A corner" is got

up by the Bulls combining, who learning that there is a large short interest, form a clique and get control of prices, securing an upward movement and the bears are forced to buy on an advancing market to fill their contracts. The whole system of dealing in stocks and produce, and of brokerage generally, is merely gambling, nothing more, nothing less.

HOW TO CURE A COLD.

The popular domestic treatment consists in the use of a hot foot-bath at bed time, a fire in the bed room, a warm bed and some hot drink taken after getting into bed, the diaphoretic action being assisted by an extra amount of bed clothes. Complete immersion in a warm bath is more efficacious than a foot bath; but the free action of the skin is much more certainly obtained by the influence of hot air — most surely and profusely, perhaps, by the Turkish bath. The Turkish bath, however, is not always to be had, and even when available, its use in the treatment of catarrh is attended with some inconvenience. In particular, there is the risk of a too speedy check to the perspiration after the patient leaves the bath. On the whole, the plan which combines the greatest degree of efficiency with universal applicability, consists in the use of a simple hot-air bath, which the patient can have in his own bed room. All that is required is a spirit lamp, with a sufficiently large wick. Such lamps are made of tin and sold by most surgical instrument makers.

The lamp should hold sufficient spirit to burn for half an hour. The patient sits undressed in a chair with a lamp between his feet, rather than under the chair, care being taken to avoid setting fire to the blankets, of which an attendant then takes two or three, and folds them around the patient from his neck to the floor, so as to inclose him and the lamp, the hot air from which passes freely around the body. In from a quarter to half an hour there is usually a free perspiration, which may be kept up for a time by getting into bed between hot blankets. I have myself gone into a hot air bath suffering from headache, pain in the limbs, and other indications of a severe incipient catarrh, and in the course of half an hour I have been entirely and permanently freed from these symptoms, by the action of the bath.

Another simple and efficient mode of exciting the action of the skin consists in wrapping the undressed patient in a sheet wrung out of warm water, then, over this, folding two or three blankets. The patient may remain thus "packed" for an hour or two, until free perspiration has been excited.

HISTORY OF BOOTS.

Boots, which are only a lengthened variety of shoes, were among the most ancient articles of attire. Shoes extended a certain height up the leg, laced, ornamented, and of fanciful colors, were in use by the ancient Egyptians, Greeks and Romans. Different kinds of half-boots were worn by the Anglo-Saxons and Anglo-Normans. In the reign of Edward IV., the boot proper, with tops and spurs, was established as an article of knightly dress. In the reign of Charles I., a boot, wide at the top, made of Spanish leather, came into use. Charles II. introduced a highly decorated French boot as an article of gay courtly attire. Meanwhile, the boot, or jack-boot as

it was called, had become indispensable in the costume of cavalry soldiers and horsemen generally, and was regularly naturalized by William III. and his followers in England. The jack-boot was strongly made, extended in length above the knee; was large at the top had a very high heel, and round the ankle it had a flat leather band bearing a strong spur. In the early years of the present century a number of members of the House of Commons wore top-boots. What contributed to break up the general use of top-boots was the introduction of the Hessian boot as an article of walking dress. It was worn over tight pantaloons and was a handsome piece of attire. They were superseded by the Wellington boot, which was introduced by the great Duke as a simplification under the loose military trouser. This species of boot has in its turn been almost entirely abandoned in England, in consequence of the universal use of short ankle boots, but it is still used by some classes of persons in the United States, with the trousers stuffed loosely in at the top.

HOW TO HARDEN DRILLS.

A watchmaker in Gosling, by the name of Schussleder, has recently published his method of hardening gravers and drills, which he claims renders them almost as hard as the diamond. He first heats the tool to a white heat, and then presses it into a stick of sealing wax, leaves it but a second there, and then sticks it into the wax in another place. This operation is rapidly repeated until the graver is too cool to enter the wax. In turning or drilling, the tool is moistened with oil of turpentine.

TELESCOPES.--HOW THEY ARE MADE.

It may not be uninteresting to the intelligent reader to know somewhat of the method of construction of these mighty engines of the stars, which are so largely the means of our astronomical knowledge. The establishment that gives birth to these monsters — but not monstrosities — is situated at Cambridgeport, Mass., within easy rifle range of Boston. It is an unpretending structure of plain brick, two stories high, about forty feet long by twenty-five feet wide, with an L of the same width and thirty feet long, and a small one-story room, perhaps fifteen by twenty-five. All the power used in this factory is in a five-horse power engine, of which more than three-horse power is seldom used.

The firm is composed of Mr. Alvan Clark and his two sons. They employ at present about a half-dozen hands, and never have, in the busiest times, more than ten. The senior Mr. Clark is now over 70 years of age, and did not commence telescope making until he was over 40 years old. He has picked up his knowledge and skill with no instruction whatever. He has never seen a lens in the process of construction in the hands of any one out of his own shop. Yet here are made those wonderful instruments which bring into our very presence objects far away in the infinity of space, and which no other maker in the world has either surpassed or equaled.

The object glass is, by far, the most difficult part of the work of telescope making. This is composed of two lenses, one of crown and the other of flint glass, the former to disperse or scatter the colors in the ray of light, and the latter to refract or bend the

rays to one point, called the focus. The combined effect is to magnify the object, and at the same time to destroy all the rainbow colors, thus presenting the object to the observer in a white light, or its natural color. These lenses are made from an immense mass of molten glass, called a "pot," which at first looks no more like a lens than a rough block of marble resembles the life-like statue into which it is chiseled.

This sawing or cutting is done by steam power, and a plate an inch thick can thus be cut in one-half or three-quarters of an hour. It is next ground down by the revolving of a concave plate pressed upon it, one surface at a time, till it becomes a rough double convex lens. It is now opaque, like ground glass, and is afterward ground or smoothed down to a finer surface by means of emery, and then polished in a hand process by rubbing it with coal tar, beeswax and rouge. When a lens is sufficiently polished to admit of the transmission of light, it is to be corrected for chromatic and spherical aberration, or confusion among the rays. The first is the showing of the colors of the rainbow, as seen in the triangular glass pendents to chandeliers, which obscure the view of the object. This is corrected by a careful adjustment of the relative thickness of the crown and flint plates.

Spherical aberration causes an unnatural rounded or curved appearance to the object. This is due to the fact that the rays of light passing through the outer part of the lens are brought to a focus sooner than those passing nearer its centre. The distorted appearance of the face as we look upon the surface of a polished teapot, or into the bowl of a shining tea-spoon, is an illustration of spherical aberration. While the work of bringing the glass to the general form of the lens, and even polishing it, is comparatively simple, the highest skill and the most studied care are strained to their utmost in properly correcting its tendency to produce aberration; and it is in this very particular that Messrs. Clark excel all other telescope makers.

The glass in this massive form is made in Birmingham, England, by Chance Bros. & Co., who are large glass manufacturers in other lines. This firm made the glass of which the English Crystal Palace was constructed. Parts are selected from the molten mass as nearly pure as possible, and moulded into rectangular blocks of convenient shape and size. Even in this apparently simple process there is need of great care and skill. The "pot" of melted flint glass, which weighs from 600 to 2,000 pounds, must be constantly stirred till the chemical change, which would fill the mass with bubbles, has ceased to act, and even till it has become so stiff in cooling that it can be stirred no longer.

To give some idea of the difficulty in this seemingly insignificant part of the work, it need only be said that the simple glass for the lens of one of the twenty-six inch telescopes cost, in its rough, massive state, no less than $6,000, and $3,000 had to be paid down before the operators would undertake the work at all, and if unsuccessful in ten trials, they were to be released from further obligation. On arrival at the factory in this country, the block of glass is cut by the revolution of a circular disk having a flange on the edge of its lower surface, which, with sand for teeth, cuts into the glass in a similar way to that in which marble is sawed. This gives the glass a disk-like form,

and the first real resemblance to a lens. As no mathematical rules can aid in the perfection of the lens this can be effected only by a wearisome system of tests, continued daily and hourly for weeks and months. By these, defects are carefully marked and are then to be removed. But the required modifications are so slight and the work so delicate that, hard as the glass is, the workmen dare undertake nothing more effectual than to simply rub down its surface by application of wet rouge with the finger tips, and often the rubbing that removes a defect in one place produces another near it. The amount of surface that is worn away in this process is incalculably small, yet it makes all the difference between a complete failure and such an objective as no one but this firm can make.

It would make no appreciable effect upon a scratch, and when one of these appears on the surface of the lens it can be removed only by going back to the grinding process, which of course necessitates the repetition of the smoothing, polishing and correcting processes afterward. It should be noticed that the repeated tests have to be made as if the telescope were already mounted and in working order, whereas, in fact, the tube and supports of the instrument are not yet prepared for use. So some temporary mounting is provided, which, though rude, must be exact and easily manipulated. And as looking at the stars can be accomplished only in the night, this would seem to necessitate working largely at those unseasonable hours when honest people are supposed to be in bed.

But Mr. Clark's contrivance for obviating these difficulties is as novel as it is original. He has excavated a passage underground 230 feet long, at one end of which he places his lens in focus, and at the other he allows light to pass through small pin-holes in a sheet of tin, which is so placed as to keep out all light except what is admitted through these apertures. Light thus admitted into this dark subterranean chamber has the effect of stars to an observer looking through the lens. In this manner, instead of working by night when the real stars can be seen, he has invented artificial stars.

In addition to these tests, they make genuine observations every fair night, and in this way have discovered many interesting and important stellar worlds which practical astronomers had overlooked. So they are doing good service to the scientific world as astronomers beyond their great acquisitions as astronomical instrument makers. It is decidedly amusing to notice the excessive care with which they mount those great plates of glass for frequent testing. If you have seen the gentleness with which a very sick child, or a severely wounded person, is moved by careful nurses, you can have some idea of the tender pains taken in moving this child of anxious and watchful toil.

A hand barrow has been constructed for this special purpose. A soft bed is prepared upon it, and carefully overlaid with snowy sheets of fine, soft paper. The glass plates are placed side by side in a vertical position, slowly moved toward each other, and kept from immediate contact by pieces of tinfoil, then turned slowly over till they rest horizontally upon a softly-cushioned stool which has been placed in the centre of the brazen "cell" or hoop of 100 pounds' weight which is to receive it. Then the cell is slowly raised till the plates rest upon a shoulder within it. Now another and smaller brass

hoop is screwed above the lens as it rests upon the shoulder, and the precious treasure is securely fastened into the cell.

It is now softly placed upon the bed, and, with great caution, wheeled across the building, where by a similar tender process, it is removed to the rolled iron tube resembling a long steam boiler in which it is roughly mounted for testing. The lens for the Washington telescope was nine months in process of construction. The present one for Mr. McCormick has already received the work of six months, and they say is now "liable to be finished any day;" but it would be nothing surprising if it still required months for its satisfactory completion. These are protected in the building by a complete system of burglar and fire telegraphic alarms contrived by the Clarks themselves, and communicating to their residence near by.

Considering the amount of untiring skilled labor expended upon these by which rude lumps of glass become worth a comfortable fortune, it will not seem strange that they are tended and watched over like a sick child. The greater number of telescopes made in this establishment are of only four or five inch aperture, which are only good sized spy-glasses.

A good four-inch objective will cost a month's constant labor, though according to the quality of the glass, some take three times as long as others. Eight or ten is considered good work for a year. A lens of this size is worth one hundred dollars in gold, and the whole instrument will bring from two hundred and fifty dollars to three hundred and fifty dollars, according to quality of work and the materials used.

THE HOME OF THE PERFUMES.

We are in the south of France, on the coast of the Mediterranean, where the cities of Nizza, Grasse and Cannes form a sort of triangle. A rich, but yet light soil; to the north, a range of mountains, which shut out the cold blasts of the north winds — these advantages combine, with a soft sky, resembling that of Italy, to make this the most charming and the most fertile part of France. It is, therefore, with a true national pride that the peasants of this district are wont to say: "Plant a walking stick and a flower will bloom from its handle."

Plants which everywhere else are cultivated in gardens as ornaments, form here the main product of the soil. There are no gardens here, for the entire district is a bed of fragrant flowers. The jessamine, the tuberose, the orange blossom, the daffodil, the rose, the acacia, and many other plants, here bud and bloom the year round. The exuberance of these lovely children of Flora affects the character of the inhabitants as well as their mode of living. A stranger is affected by the fragrance as if drugged by some narcotic.

The culture of these flowers is almost the exclusive occupation of the peasants. During the Summer months all hands are busy among the flowers — weeding and watering. Old and young are occupied in gathering the leaves of flowers, of which it takes so many to make a pound.

The following statistics will show to what extent this business is carried on: The product of one year has been 14,750,000 lbs. of orange blossoms, 530,000 lbs. of roses, 100,000 lbs. of jessamine, 75,000 lbs. of violets, 45,000 lbs. of acacia, 30,000 lbs. of geranium

leaves, 24,000 lbs. of tuberoses, 5,000 lbs. of daffodils, besides a large quantity of lavender, and many other flowers.

The quantity of perfume contained in this mass of leaves may be imagined, yet the peasants themselves do not understand the art of extracting the delicate odors from the flowers, among which nature has thrown them, and it is the chemist who has to continue the work. Thus we behold in the midst of these fields of flowers the signs of modern industry, the numerous tall chimneys of the different laboratories. It is the same here as everywhere else: the first producer has to content himself with but a small profit; and the land-owners consider it a good business if they receive from the chemists one-third of the total profit.

In these laboratories every spark of poetry connected with the beauty of flowers disappears. The leaves are turned into a solid mass; the balmy essence takes the place of the emblematic interpretation — a chemical process has finished the work.

Oils or greasy substances are impregnated with the odoriferous elements of the flowers by three different operations. Two of these depend upon the fact that oils or fats brought in contact with the flowers, absorb and retain their fragrance. If afterward these perfumed fats and oils are thrown into pure alcohol, the latter extracts the perfume from the oils or fats, and thus an essence is obtained.

These two methods of working are called in France "enfleurage" and "maceration." For the process of "enfleurage" a sort of a frame with shelves is used. Between the wooden shelves are glass tablets, upon which the purified fat is spread. Upon these are laid the fresh-picked flowers. Some forty to fifty of these shelves are piled up and left for twenty-four hours, after which time the old flowers are removed, and fresh ones put in their places. This process is continued until the fat is sufficiently impregnated with the odoriferous principle of the flowers; then the fat is melted from the glass at a moderate heat, and separated from the leaves which may have adhered to it, after which it is packed in jars and boxes, and is then ready for exportation.

"Maceration" is performed by soaking the flowers for a certain length of time in the fat or oil. Practice has shown that not all flowers will yield their perfumes in this way; some discharging their perfume with more facility than others. The acacia is particularly adapted for "maceration."

Of late years another process has been introduced, consisting in treating the flowers with various ethers, etc., but it is not yet in general use. Lastly, the odor of some flowers is obtained by distillation; but delicate odors are injured or dispersed by this operation.

The essence of orange blossoms obtained by "enfleurage" is far superior to that gained by distillation. Lavender is almost the only plant that does not lose by distillation.

Extracts obtained by "enfleurage" or "maceration" are the condensed odors of the living flowers, while by distillation we obtain only a second-class perfume.

It has been a question of considerable importance how to obtain the extracts of flowers of tropical countries. Experiments also have been made in Algiers, but without favorable results. However pure the fat or oil used may be, it soon turns rancid in a hot climate. If the process of etherizing is brought to perfection, the flower culture of the

south of France will doubtless diminish, for the tropics of America alone would furnish enough perfume to supply the entire western hemisphere.

CURIOUS CALCULATION.

There is something wonderful in figures; and numbers, when calculated, startle us by their immensity. We talk of millions and billions with little thought of the vastness of the sum we name. The lips may utter the words glibly, but the understanding fails to grasp their real significance. Take our own national debt as an illustration. Everybody knows it is large, but few have ever stopped to consider its appalling magnitude. A few calculations will not, we trust, be uninteresting to our readers:

Let us suppose that the national debt is, in round numbers, $2,500,000,000. If an experienced cashier was to commence counting this, at the rate of three silver dollars per second, working diligently eight hours per day, 300 days in the year, it would take him about one hundred years to complete the count.

If the silver dollars were placed side by side, touching each other, they would reach nearly three times round the world; they would pave a highway the width of Chicago's streets more than 200 miles in length.

Fused into one solid mass of silver they would make a column ten feet square and 2,500 feet high; or a bar fifty miles long and one foot square.

If a piece of silver be estimated at one ounce in weight, and the money loaded into carts containing one ton each, and driven one before the other, each horse and cart occupying two rods, the procession would extend five hundred miles.

Or consider that only about 1,000,000,000 minutes have elapsed since the birth of Christ, and that if one dollar had been put away each minute, day and night, since that event, the accumulation would amount to but little more than one-third of the debt this nation now owes. If this calculation was applied to England or France, whose national debt is nearly twice as large as ours, the result would be still more startling.

HOW JAPANESE MECHANICS WORK.

A correspondent of the New York *Times* gives the following interesting account of the Japanese artisans in San Francisco:

"The steamship Colorado brought over a company of Japanese performers, calling themselves the Ha-ya-ta-kee troupe. During the past week they have been fitting up the Metropolitan theatre in the similitude of a Japanese temple, for the exhibition of their feats of strength. It is said that the entire company, even the workmen who are engaged in putting up the stage, belong to one family. It is a curious sight to see these Japanese carpenters at work. They use their hands and toes at the same time, the latter being as handy as their fingers. At first there seems to be a great advantage in their having four hands instead of two, and, although they seem to work with great rapidity, yet they do not accomplish one-half as much as a good American mechanic would in the same time. A Japanese carpenter makes no use of work benches or vises. If he wants to sharpen a saw, he squats on his hams, places the back of the tool to be operated on on the ground, grips one end of the saw with his left hand, seizes

the other with the toes of his right foot, and goes to work. Their tools are not like American tools, though they have a slight similarity, showing that all tools have one common parentage, whether their inventor was Tubal Cain or some other artificer. All Japanese saws are shaped like butchers' cleavers. The handle is like the handle of a cleaver, but flattish, as if whittled out of a piece of inch board; the metal shank of the saw is driven into that handle, and the whole is secured by being wrapped with fine split cane. The metal of the saw is about the substance of our saws, but the teeth are narrower, giving more of them to the inch, and much longer. They are all pointed toward the handle, and cut the wood like so many hocks.

"When a Japanese wants to rip a plank, he places it across any thing which will elevate the end a few inches, then stands on the wood and cuts it by seizing the cleaver-looking saw in both hands, and pulling it toward him. Thus, by a number of short, quick, up strokes, he gets through a plank, not so speedily but quite as effectively, as an American carpenter would with the long, slow, down stroke of the rip-saw. The planes are small, with single irons — no handles. They are shorter, lighter and the wood shallower than ours, being generally not more than an inch deep. To plane a piece of wood, they lay it on the ground, squat on their hams, hold it fast with their toes, and work the plane with both hands toward them. To drill a hole they have a short awl inserted in a round piece of stick eight or nine inches long. They take the wood between their toes, squat as before, and make the hole by rubbing the handle of the awl between their hands, in less time than one of our carpenters could drill one with a gimblet. Their hammers are solid cylindrical pieces, not made shapely with waists and graceful outlines like ours. They have the same flat-sided handles as the saws. The Japs have iron squares, not unlike American squares, marked with degrees. Their measures are brass, very light and fluted. On one side the inch, or what stands for the inch with us, is 1 3-15 inches, and divided into ten parts. On the other side is a different scale, measuring 1 13-16 inches, and divided into twelve parts. Some of their tools appear to be mere children's toys; for instance, they have a smoothing plane two and one-half inches long, one inch broad and half an inch thick. Their chisels are light and small. The cutting parts of some are the size and shape of a section of half a dollar — the square being the cutting edge, and a round metal shaft being connecting the convex side with wooden handle.

"The most ingenious article in their tool-chest is a chalk-line. It is a wooden cup containing a spongy substance steeped in India ink. This is pierced front and back, and the marking line passes through it. The end of the line, is attached to a small awl; the other end of the line, after passing through the cup, is wound round a reel, not unlike a fishing-rod reel, which takes the place of the handle of the cup. To mark a line down a plank, the Japanese carpenter sticks the awl in at one end of the proposed line, carries the cup to the other, the line paying itself out as he does so; he holds the line down to the board when he reaches the desired spot, strikes the mark, and then takes up his cup and reels up the line as he walks back to the spot where he inserted the awl. The process of pay-

ing out the line and reeling it up again both draw it through the ink supply in the cup and keep it ready for action.

MANUFACTURE OF IVORY COMBS, PIANO KEYS, Etc.

The factories of Pratt, Reed & Co., located on the road to Chester, Conn., are owned by the same company that manufacture under the same name in Meriden. The company is a consolidation of three rival concerns that united under this name in the year 1863. It has a capital of $175,000. The buildings in Deep River are located on a lot of eight to ten acres. This and the Meriden establishment combined makes this the largest concern of the kind in America. In Meriden are manufactured the melodeon key boards and the ebony sharps for pianos and melodeons. The company now employ some seventy hands at Deep River.

The elephants' tusks are purchased by this company from importers residing in Salem, Mass., and Providence, R. I., to whom most all the ivory that reaches this country is consigned. The price paid has ranged from two-fifty to five dollars per pound, and now stands at about three dollars per pound. As this concern alone uses 100,000 pounds of ivory per annum, it will be readily seen that elephant hunting may be as profitable as it is said to be exciting. The tusks received vary from six to nine feet in length, the former being about the average. They have been found weighing about ninety pounds, though the average is but seventy pounds. The tusks are hollow in the center up to the point where they grow out of the heads, while a small nerve runs clear to the tip of the tusk.

The first operation is "junking," when the tusk is sawed into semi-circular blocks and again sawed either into the length of a comb or of a piano-forte key, as may be required. The outer "bark" that encrusts the ivory is then hewn off, when the blocks are marked with a lead pencil, as required, according to the size of the combs. A fine saw, carefully watched, then cuts off the strips for the combs. For piano-forte keys, the junks are hewn on a machine, and then a split saw cuts them into blocks, whence they are again sawed into the required sizes for "heads" and "tails." Of the combs, the ends are next rounded, and the ivory partially dried in fire clays, so that they can be turned in the ivory planing machine invented by this firm. A very neat sorting machine next sorts them into sizes of from one, two to four inches, and deposits them in boxes which are revolved by an endless leather belt. The combs, after being planed and sorted, are bleached in the bleach houses (alluded to hereafter), and then polished on a smooth wheel on which a cotton cloth with some unknown dressing (which has been substituted for buckskin) has been placed. The wheels have to receive this dressing after each three dozen combs have been polished. The combs are then sized, when comes the most delicate operation of all, sawing the teeth. This is done with imported saws most finely tempered, and as thin as the thinnest paper — so thin that they cut from forty to seventy teeth to the inch. Though the same are imported, their teeth are cut by the company's mechanics, and most delicate workmen they have to be. The combs are then dampened, when they are pointed on a very curious machine with very rapid motion. This completes the combs,

which are then packed up according to their sizes.

The piano ivory after being sawed into heads and tails, as spoken of, are soaked, next washed off by hand, then put into trays and taken to the bleach houses, which are constructed like long green houses. The trays are hung up directly under the glasses, where the ivory is exposed for from eight weeks to six months, according to the weather and sunlight. The combs are exposed in this way after being sawed, for from four to five weeks. The combs slide into the trays, while the piano forte keys are held by pins. After one side of the ivory is thoroughly bleached the trays are reversed, and the other side exposed. The bleach houses are five in number and very large, from 160 to 600 feet long. One of them, however, is used as a lumber storehouse. Of late years this company have manufactured its own piano forte key-boards. Of frames for these they manufacture ten different styles for as many different piano forte manufacturers, embracing some of the most prominent in the country. For one firm alone they make 100 sets per month. In this department of the factory is a very neat machine for morticing and broaching. In these frames are used black walnut, cherry, pine, and some ash. The key-board itself is of pine, except the front and back slips, which are of bass wood. Next to the frame making and cutting, comes the board fitting. The ivory laying is next done, then the "lushing," which last operation is only gone through with when desired. The manner of it is as follows: — The front of the key-board is in front of the operator, with the mortice in which the pipe plays directly before him; into the mortice he forces a little silk cushion to prevent a rattle. The key-board is next placed in a machine which throws a very fine white oily dust, which would do admirably for snow in amateur theatricals. The sawing operation necessary to separate the different parts of the key-board are next carefully prepared, and the edges of the keys filed, after which the sharps are separated from the keys and then buttoned.

The keys are next put on the frame and squared. The ebony sharps (made at Meriden) are then put on and the whole wiped off and balanced. The final operation is to fill the edges and "ease" the boards, which are then ready for the market.

The piano forte key-boards are made entirely to fill orders. This department of the business is but a few years old. Of combs this firm turns out 500 dozen a day here, and the same number at Meriden.

ORIGIN OF THE WORD YANKEE.

There is no question or mystery about the origin and meaning of the word "Yankee." It is older than the New England colonies, and was used by Samoset in his historical "Welcome Englishmen." "Welcome Yenghese" was what he actually said, "Yenghese" being the nearest approach the Indian tongue could make to the word "English." Yankees and English are synonymous terms, and the word was applied to the Northern English colonists by the Indians to distinguish them from the French on one side and the Dutch on the other. The latter people soon adopted the term, and it was readily accepted by the New Englanders themselves. It was never considered a term of reproach, but rather one of honor, by the colonists.

"PASS THE PEPPER."

Of all the aromatics which are partaken of by man as flavorers to his food there is none more common than pepper, and when unadulterated, its tendency, in small quantities, is rather to aid digestion than otherwise. The three important peppers commonly found on the dinner table are white, black, and cayenne, all natives of the the tropics. They are much used (to stimulate digestion) by their human brethren — those hot and choleric old nabobs who confer a benefit on the world by living in hot climates far removed from the haunts of civilized life. Thus the *chow chows, curries,* and other hot dishes so relished by your yellow-faced East and West Indians owe their flavor and pungency to the amount of pepper they contain.

There is one variety of the genus *Piper* to which the white and black peppers belong (cayenne being a member of the genus *Capsicum* — called so, by the bye, from a Greek word which signifies to bite); this variety is a great favorite with housekeepers and cooks, and has received from them the flattering name of "allspice," as it combines in itself the flavor of cloves, nutmeg, and cinnamon; it grows plentifully in Jamaica and other American islands, where it was first discovered by the Spaniards, who gave it the name of *Pimenta de Jamaica.* The French call it the "round clove."

Black pepper is cultivated in large quantities in Malacca, Java, and especially Sumatra, the trade of these places being almost exclusively in these spices. A pepper garden during the ripening of the pod is a lovely sight, being a large plot marked out into regular squares of six feet, in each of which are planted young trees called *chinkareens*, that serve as props to the pepper vines. When the prop has reached twelve feet high, it is cut off and the vines planted two to each prop. A vine is three years in coming to maturity, and the fruit, which grows in long spikes, is three or four months in ripening. The berries are plucked as soon as ripe, and spread on mats upon the ground to dry, by which process they become black and shriveled, and are imported here as black pepper. In this city, and distributed throughout the States, are many mills where pepper is ground, and, we are sorry to say, it is often sophisticated with burnt crust of bread and other adulterations.

The Sumatrans once did a genuine Yankee trick in connection with pepper, which is worth recording. They steeped the pepper corns in water until their shells or outer coat burst, and then drying them without it, sold for three times the price of the black, as a different species, to the East India Company, who then monopolized the pepper trade. The company, having swallowed the story, made the buyers swallow it too, and ever since we have had the two peppers, white and black, both coming from the same plant, but one possessing its coat and the other being deprived of that useful appendage, and so weakened in its pungency. The effect of pepper is stimulative and carminative, and as a condiment it seems not only to add a peculiar flavor of its own to dishes into whose composition it may enter, but also to develop the flavor of the other ingredients. Taken in small quantities, it warms the whole system, but if a large dose be placed upon the palate, it seems to burn the tongue and throw the whole mouth into a perfect glow. As a medicine it has been proved beneficial in cases of vertigo, paralysis and inter-

mittents. The pungency depends on the presence of an aromatic resin, which can be extracted by ether and alcohol, and partially by water.

Cayenne was first noticed on the coast of Guinea, and has been generally used by the natives of those climes in which it grows as a strengthener for the stomach. It is an extraordinary fact, but still true, that although savages may be unacquainted with the polite arts, they are generally well informed upon the subject of gastronomy, and to suit their sometimes peculiar tastes, they generally discover all the edible good things which their native soil affords. It cannot be denied that hunger and the palate are great equalizers, and the stomach, much as we abhor gluttony, does much for civilization; in fact, his stomach and its wants distinguish man from the brutes, for, as Dr. Kitchener correctly observed, "Man is the only cooking animal."

The cayenne of commerce is the grain or seed of the capsicum ground and mixed with flour and then baked into little cakes in an oven; these are again broken up and mixed with more flour and placed in jars for sale. The tree or plant is very beautiful, and forms a great ornament to a garden, but it is very tender and requires much care. It is more pungent than either white or black peppers, and is often adulterated with logwood and mahogany sawdust and red lead; this latter can, however, be easily detected by placing a spoonful carefully in a glass of water, when, should it contain any red lead, it will from its specific gravity quickly drop to the bottom while the cayenne will sink but slowly. A very pleasant drink may be made for these cold winter nights, and one that is healthy too, from pepper. Here is the recipe: Place three or four lumps of sugar with half a teaspoonful of pepper in a tumbler and fill up with hot water; when the sugar is dissolved, drink. It is not only pleasant to the palate, but warms the whole body more effectually and quicker than any spirits. Those of our readers who try our recipe once will often, during the coming winter, when the fire burns low, and they feel chilly generally, exclaim in the language of our caption, "Pass the pepper."—*Scientific American.*

SOME FACTS ABOUT THE EAR.

Never pick or scratch the canals of the ear with pins, pencils or scoops. It will eventually cause troublesome inflammation and subsequent deafness.

Do not try to wash the canals of the ears with so-called aurilaves, or end of the towel, or even with the fingers. Such treatment produces impaction of the wax and is not necessary for cleanliness.

Do not try to remove the wax with the ear scoop. There is danger of injuring the drum-heads, or of causing inflammation. Have some competent person inspect the parts with an ear-mirror, and move the wax with the syringe, charged with warm water. This is the best way to remove any foreign body from the external auditory canal. Only occasionally other means are required. The parts should always be under inspection.

A discharge from the ear is always fraught with danger. It should never be neglected. Occasionally it stops itself, but frequently leads to dangerous complications, such as inflammation of the brain, disease of the surrounding bone, and may set up inflammation in other parts of the body, as the lungs, bowels, etc.

The middle ear, from which the discharge generally comes is small, but is exceedingly vulnerable. It is surrounded on all sides by vital organs, the partition wall being thin. Syringing with warm water in such cases is absolutely essential and unaccompanied by any danger whatever.

Under proper treatment there is no danger of "driving in" the discharge, which is neither a "healthy sign" nor a "safety valve."

Never keep the canal blocked up with cotton, or anything else, while discharge is present.

The ear requires fresh air and is not likely to become more inflamed by its admittance, unless exposed to a direct draft, which should be avoided.

Black sheep's wool has no healing virtue.

Wetting the hair, especially when it is long, and allowing it to dry slowly, often produces deafness and aggravates it when already present.

DIAMONDS.

The diamond occupies the highest rank among precious stones, and possesses an intrinsic value in almost every part of the globe. Diamonds follow the same laws which govern the value of every other commodity — those of supply and demand; and as the production of these gems has diminished, and the number of wearers greatly increased, the price has gone on augmenting, and no doubt will continue to augment. Since 1849, a steady rise of from five to ten per cent. per annum has taken place in consequence of the production of the diamond mines decreasing. India and Brazil have been the two great sources of supply, but the mines of the former are now nearly extinct, and diamonds which were found there take the trade name of "old mine" stones. The rough diamond generally loses fifty per cent. of its weight in cutting and polishing. They can be cloven with facility in a direction parallel with the octahedron or dodecahedron; or, to use the lapidaries' expression, "splits easily with the grain." This quality much assists the otherwise tedious operation of cutting or grinding the diamond, particularly where it is desired to get rid of flaws. Diamonds, when perfect, should be clear as a drop of the purest water. The terms, FIRST WATER, SECOND WATER, etc., etc., mean only first and second quality. When a diamond has a very decided color, such as blue, red, green, etc., it is called a fancy stone, and will bring a most exorbitant price. The diamond cuts glass with great facility, but not every stone can be used for that purpose. It is required to find one whose angles are naturally acute. These stones are called "glaziers."

The diamond is not acted upon by any acid, but is a combustible body, becoming entirely consumed when exposed to a very strong degree of heat. In spite of its hardness, it is capable of being reduced to powder, and the mistaken idea which used to prevail, and even now exists, that the best test of the reality was to put it on an anvil and strike it with a hammer, when, if genuine, it either broke the hammer or buried itself in the anvil, has been the cause of the loss of many fine gems, which were either crushed or thrown away as valueless. The origin of the word carat weight is from an Arabic word, "Kuara," the name of the seeds of the pod-bearing plant, growing on the gold coast of Africa, which are almost invariably of an equal weight, and were formerly

used for weighing against the grains or dust of gold. This weight was adopted in Hindostan, and has thence spread all over the world. Large diamonds, as may be supposed, are of very rare occurrence. Diamond-cutting forms one of the principal branches of industry in Amsterdam, and more than fifteen-sixteenth of the diamonds found are now cut there. The work, as may be supposed, demands the greatest nicety. The purest stone, cut by unskillful hands, remains a dull mass, without life or lustre, and, in fact, on the regularity of the facets and the perfect polish, depends the value of the stone, nearly as much as on the original material. The double cut brilliant is the most common form at the present day, but for very small stones, the single cut displays to best advantage. A stone that is well cut should have a very thin edge at the girdle; and any overweight or substance to make a diamond heavier, only detracts from its play or beauty.

To select a perfect stone, first, it must be perfectly free from the faintest tinge of color *of any sort;*— from any flaws, specks and marks, or fissures in any part; must be bright and lively, and free from what is technically called 'milk,' or 'salt,' which are semi-opaque in the body of the stone. In order to ascertain this, it is sufficient to breathe on the stone, when any defect or color will be apparent. It is necessary to look at a stone on all sides, as a defect may exist which is not visible in looking at the table.

Second, the stone must be well proportioned, and properly cut. From the table to the girdle must be one-third, and from the girdle to the culet two-thirds of the whole thickness of the stone. The size of the table must be four-ninths of the extreme size of the stone, and the culet must be one-fifth of the size of the table. These rules are given as the highest standard test, but so few stones are found that are really perfect, that for all commercial purposes, any imperfection that is not visible to the naked eye, passes for a perfect gem.

FAMOUS DIAMONDS.

A very appreciable proportion of the wealth of the world is at present represented by diamonds. Every considerable stone has its name, history and locality well settled. When an addition to the catalogue is made necessary by the acquisition of a new stone, its advent is immediately announced to the world, and it becomes at once a sort of social and civil power in society. This distinction is bestowed only on diamonds exceeding $20,000 in value.

The "Koh-i-noor" is a very celebrated diamond belonging to the British crown. Its weight is 106 carats. It has a thrilling but somewhat ominous history. It was once the property of the great Aurungzebee. Its weight, when first seen by Tavernier, was about 700 carats. The "Regent," celebrated for having been so long concealed by a slave in a wound in his thigh, made for that purpose, weighs 136 carats. The "Braganza" diamond, in the crown of Portugal, is the largest known. It was found about 100 years ago, in Brazil. Its weight is 1830 carats! Doubts have been thrown upon the genuineness of this stone. we know not with how much reason. The "Mattam" diamond, in possession of the Rajah, is said to be a very beautiful gem. Its weight is 367 carats. It is pear-shaped and indented at one

end. It was found in the island of Borneo. The Dutch Governor of Batavia is reported to have made an offer for this diamond of two ships of war, with their armaments complete, and $250,000 in money. The "Orloff" diamond, belonging to the Czar of Russia, is one of the most valuable known. It was once the eye an of Indian idol, and afterward one of the ornaments of the celebrated peacock throne of Nadia Shah. It was stolen by a Frenchman, and by him sold to Catherine II. for 450,000 rubles, a pension of 20,000, and a patent of nobility. The "Cumberland" diamond was presented to the conqueror of Culloden by the City of London. It has since been claimed by Hanover, and restored to that country, whether by the Cumberland family or the British Government, we do not know. Its value is $100,000. The "Sancy" diamond was once the property of Charles, Duke of Burgundy, who wore it in his hat. He lost it at the battle of Nancy, about the middle of the fifteenth century. It was found by a Swiss soldier, and sold to De Sancy, in whose family it remained about 100 years. Henry III. of France borrowed it, to be used as a pledge. The servant who was sent to deliver it was robbed and murdered, but the diamond was found in his stomach by De Sancy, who had known his fidelity, and looked for it there. It became the property of James II. of England, and passed from his hands into those of the King of France, and was lost in the confusion of the Revolution. It was found, and became the property of Prince Demioff, who lately sold it for a large sum.

The celebrated "Blue Diamond" was lost with the "Sancy," and has never since been heard of.

The "Florentine Brilliant" is a fine gem in the crown of the Emperor of Austria. The "Pitt" diamond, also called the "Regent," was once the property of the Duke of Orleans; its weight was 410 carats. The "Piggot" is another historical diamond. The "Star of the South" is a large diamond, cut a few years since by the Costars, but we are not certain about the ownership. Its weight in rough stone was two hundred and fifty-four carats; when finished it was less than one-half that weight

Diamonds are not always colorless. Some are opalescent; some black. They have also been found red, pink and green. Those of a pure water transparency are the most valuable.

THE BANANAS AND PLANTAINS OF THE TROPICS.

Poets have celebrated the banana plant for its beauty, its luxuriance, the majesty of its leaves and the delicacy of its fruit; but never have they sufficiently praised the utility of this tropical product. Those who have never lived in southern countries are unable to appreciate its value. Some look even with indifference upon the gigantic clusters of this fruit, as they are unloaded from the steamers and sailing vessels; and yet they deserve special attention and admiration, for they are to the inhabitants of the torrid zone what potatoes are to those of the north temperate zone.

The banana tree is one of the most striking illustrations of tropical fertility and exuberance. A plant which, in a northern climate, would require many years to gain strength and size, is there the production of ten or twelve months. The native of the South plants a few grains, taken from

an old tree, in a moist and sandy soil, along some river or lake; they develop with the greatest rapidity, and at the end of ten months, the first crop may be gathered, though the clusters and bananas are yet small; but the following year one cluster alone will weigh some sixty or more pounds. Even in the South they are cut down when green, as they lose much of their flavor when left to ripen or soften on the tree.

The trunk of the tree, if it may be so called, and which grows to the height of some fifteen feet, is formed only by the fleshy part of the large leaves, some of which attain a length of eighteen feet, and are two and a half feet width. While from an upper sprout you perceive the large yellow flowers, or already formed fruits, you see underneath a cluster which is bending the tree by its weight.

The plantain tree is much the same as the banana, with the difference, however, that its fruit cannot be eaten raw, like the banana's, and that it is much larger in size. Almost every portion of the banana tree is useful. First of all, the nutritious fruit. The plantains when green and hard are boiled in water or with meat, like our potatoes, or they are cut in slices and fried in fat when they are soft and ripe. There is a singularity about the boiled plantain worthy of being mentioned. Pork especially, and other meats are so exceedingly fat in the tropics that they would be most disgusting, or even impossible to eat with either bread or potato, but the plantain seems to neutralize or absorb all the greasy substance, and the fattest meat is thus eaten by natives and foreigners without the least inconvenience.

Ripe bananas are mashed into a paste, of which the natives bake a sort of bread, which is very nourishing, though somewhat heavy. This paste, which contains much starch, can be dried, and thus kept for a length of time, which is of great service to mariners. The young sprouts are used and prepared like vegetables, and the fibrous parts of the stalks of the majestic leaves are used like manilla for ropes and coarse cloth.

The utility of the leaves is a theme rich enough to fill a volume; they are used to cover the huts, for table-cloths and napkins, or wrapping paper. The dough of bread, instead of being put in a pan, into the oven, is spread on a piece of plantain leaf; it will neither crisp nor adhere to the bread when taken out. The Indians of America carry all their products, such as maize, sugar, coffee, etc., in bags made of this leaf, which they know how to arrange so well, that they transport an "aroba," or twenty-five pounds, any distance without a single grain escaping, and without any appliance other than a liana or creeper to tie it up with. As to the medicinal qualities of the leaves, they are numerous. Indeed a book has been written upon them. I speak, however, from my own experience. The young, yet unrolled leaves are superior to any salve or ointment. If applied to an inflamed part of the body the effect is soothing and cooling, or if applied to a wound or ulcer, they excite a proper healthy action, and afterwards completely heal the wound. Decoctions made of the leaves are used among the natives for various diseases.

Since the beginning of the world this plant has ranked among the first in the Flora of Asia. The Christians of the Orient look upon it as the tree of Paradise which bore the forbidden fruit, and they think its leaves fur-

nished the first covering to our original parents. According to other historians, the Adam's fig was the plant, which the messengers brought from the promised land to Moses, who had sent them out to reconnoitre. "It is under the shade of the *musa sapientium,* that," as recorded by Pliny, "the learned Indians seated themselves to meditate over the vicissitudes of life, and to talk over different philosophic subjects, and the fruit of this tree was their only food." The Oriental Christians, up to the present date, regard the banana almost with reverence; their active fancy beholds in its center, if a cut is made transverse, the image of the cross, and they consider it a crime to use a knife in cutting the fruit.

In the holy language of the Hindoo, the Sanscrit, the Adam's fig is called "modsha," whence doubtless, the word "musa" is derived. It is generally believed that the plant came from India to Egypt in the seventh century; it still forms a most important article of commerce in the markets of Cairo and Alexandria. In the year 1516, the banana was brought to the West Indian Islands by a monk, since which time it has rapidly spread over the tropics of America, and is found to the twenty-fifth degree north and south of the equator. It is equally indispensable and is appreciated by the immigrant and by the native as a beautifier of the landscape; affording shelter from the sun and rain, and giving bread to the children; for if every other crop should fail, the hungry native looks up to the banana tree, like a merchant to his well-filled storehouse.

THE oldest stove, probably, in the United States is that which is still in use at the capitol in Richmond, Va. It was made in England in 1770.

WHERE AND HOW TIN IS OBTAINED.

Tin is one of the most valuable of metals, and its use, already widely extended, constantly increases. In a pure state it possesses no properties injurious to health, and hence it enters largely into the construction of culinary utensils. Its ores are not so widely and generally distributed as the ores of iron, copper, and lead, but in certain localities immense deposits of this beautiful metal are found.

One of the most celebrated of these localities is Cornwall, in England, where tin mines were worked before the invasion of the island by the Romans, and the mines of this district are the most important in the world. Tin ores of a very fine quality are also found on the Malay peninsula, Banca in Asia, and in Bohemia and Saxony in Europe. They also exist in Mexico and other localities in small quantities and of inferior quality.

Tin ores are found in veins, or in detached masses in alluvial soils, where they have been carried by the action of water. The latter ores are hence called "stream tin." The examination of the deposits of stream tin frequently leads to the discovery of the principal vein from which the broken masses of ore have drifted.

When the ores are got out of the mines they are sorted by hand to separate the purer portions from the inferior qualities. The inferior portions thus separated are crushed in a stamping mill and washed with water to remove earthy matters. It is next roasted in a reverberatory furnace to expel arsenic and sulphur, which are nearly always found associated with tin ores. The heat in the roasting process expels these substances in the form of vapor, the arsenic almost

wholly, and the sulphur partially. The remaining sulphur is mostly combined with copper in the form of a sulphate — blue vitrol. This is now removed by a leaching process which dissolves out the salt.

The iron which the ores contain having by these processes been converted into the peroxide of iron, is next removed by washing. The tin oxide being considerably heavier than the iron oxide, the latter is carried off by a stream too feeble to carry off the oxide of tin.

To get rid of the oxygen and the remains of silica still mixed with the ore is the next step. The washed ore being ready for reduction, it is mixed with from one-fifth to one-eighth of its weight of powdered anthracite or charcoal, the latter being by far the best, as it conveys no additional impurities to the tin. A small portion of lime is added as a flux and the whole is placed in the reducing furnace. The heat is slowly raised so that the oxygen of the ore combines with the carbon before the fusing point of the silica is reached. After five or six hours the heat is made very intense, and the silicious matters form a fluid slag which floats on the surface of the melted tin.

The latter is now drawn off and cast into ingots, which are, however, still too impure to be marketable.

The first step in the process of refining consists in what is termed "*liquation.*" This is performed by heating the ingots until the purer portions melt and run off, leaving behind an alloy which is remelted and forms an inferior quality, "block tin." The purer portion being drawn off into a pan is kept in a gentle state of fusion for some time, and is stirred with sticks previously soaked in water. The steam generated from the water-soaked sticks escapes with considerable force and carries to the surface the dust, slag and other impurities, acting precisely like the air or water used in jiggling machines for separating ores from their gangues.

The finer portion of metal lies on the surface of the molten mass, directly beneath the floating slag, and this is often reheated to a temperature just below the point of fusion. Pure tin at this temperature becomes crystalline, and is easily broken into small fragments called "grain tin."

The purest commercial tin is the celebrated Banca tin, brought from the island of Banca, which lies east of Sumatra. This tin is employed in the manufacture of the finest bells. It is almost chemically pure. English tin is more or less contaminated with arsenic, iron and lead.

ANCIENT USES OF CORK.

There are some substances in the use of which we have not made much progress, partly from the fact that other materials have been discovered to supply their place, and partly from the substance itself possessing such palpable peculiarities that its earliest discoverers must have seen at once for what it was most applicable. This is the case with cork. The Romans used it as soles to put into their shoes to keep their feet warm and dry; and as there were no high heels in those days, the ladies used it to make them appear tall. Camillus swam the Tiber with the aid of a cork jacket, fishermen used it as floats to their nets, and buoys to their anchors, and Pliny tells us that it was employed as stoppers to vessels of all kinds. The old Spaniards lined the walls of their houses with

cork, because it kept them warm and prevented dampness; and lastly, the Egyptians manufactured coffins of it, which, being lined with a resinous composition, preserved their dead from decay. The method employed in Portugal of cutting the bark and burning the outside, is the same to-day as it was one thousand years ago; so that altogether, we can not say that we have done very much with cork that has not been done before. It is quite time that we made a start and discovered some new uses and appliances for this cheap and plentiful material.

THE CORK TRADE.

The Boston cork trade amounts to about one hundred and fifty thousand dollars per year. This branch of business, though suffering of course, in common with all others, from the influence of the panic, has not quite reached that dead level of stagnation from which some branches of trade are suffering. The raw material from which corks are manufactured is all imported, and, as a duty of five per cent. was placed upon this material about a year ago, the prices of corks have not partaken of the general downward tendency. Business in this line of trade is always more sluggish in the winter than summer, and a brisk trade is not expected at this season of the year. The sales of cork dealers are made to druggists, bottlers and retailers of beverages, and it will readily be seen that the orders which come from the last mentioned class of customers would be much greater in summer than in winter. Most of the corkwood comes from Spain, though an inferior quality is brought from other countries on the shores of the Mediterranean, especially from Sicily. This material is the bark of the cork-tree, so called, a tree of the oak species, none of which grow in this country. The bark is thick or thin, according to the age of the tree, and that which is used by cork manufacturers varies from half an inch to three inches in thickness. The exterior appearance of the bark does not differ much from the interior, and resembles the appearance of hemlock bark after being scraped somewhat, except the cork bark is considerably lighter in color. A cork-tree may be stripped of its bark completely, and a new bark will form in the course of seven or eight years. The cork is made up of concentric bark layers in the same way the wood part of the tree is made up of concentric wood layers, and by ascertaining the number of layers the age of the bark or tree can be determined. The bark is filled with pores running from side to side, and for this reason the cork-manufacturer so cuts it that these pores may not run lengthwise of the cork when it is made. The material is first cut into what are called straight corks, and tapering corks are made from these by paring one end. The corks are sorted into three qualities and are then ready for market. The raw material is bought by the pound, while the corks are sold by the gross. The bits of cork wasted in the manufacture are mixed with tar and sold for fuel.

HUMAN ENDURANCE.

During the Arctic voyages in search of Sir John Franklin, it was ascertained what a seaman can do in the way of traveling, carrying and dragging. The maximum weight proper per man was ascertained to be 220 lbs., and of that weight 3 lbs. per diem were consumed by each man for food

and fuel — namely, 1 lb. of bread, 1 lb. of meat, while the other pound comprised his spirits, tea, cocoa, sugar, tobacco and fuel for cooking. Upon this estimate it was found that, for a hundred days' journey, they could march ten miles per diem, and endure with impunity a temperature of 50 degrees or 60 degrees below freezing point.

LEAKAGE OF GAS-TAPS.

Many people are annoyed by the slight leakage of gas-taps, causing an offensive odor deleterious to health in the apartments where they are placed, and also increasing their bills. In many cases they may easily remedy the evil without sending for a plumber or gas-fitter. To do this, they should turn off the gas back of the meter; then take out (a screw-driver is all the tool required) the plug. Next, light a wax, sperm, or parffine candle, and drop the melted wax, sperm or paraffine upon the surface of the plug, till it is covered with a thin layer. Next screw in the tap, and in nine cases out of ten the leak will be stopped and remain stopped.

EBONIZED BLACK.

Take 1 gallon of strong vinegar, 2 pounds of extract of logwood, ½ pound green copperas, ¼ pound of China blue, and 2 ounces of nutgall. Put these in an iron pot and boil them over a slow fire till they are well dissolved. When cool, the mixture is ready for use. Add to the above ½ pint of iron rust, obtained by steeping iron filings in strong vinegar. The above makes a perfect jet black, equal to the best black ebony. This recipe is a valuable one.

VALUE OF THE SMELLING FACULTY.

In Sir W. Temple's essay on "Health and Long Life," he says:—

"Fumigation, or the use of scents, is not, that I know of, at all practiced in our modern physic, nor the power and virtues of scents considered among us, yet they may have as much power to do good, for ought I know, as harm, and contribute to health as well as disease, which is too much felt by experience in all that are infectious, and by the operation of some poisons that are received by the smell. How reviving, as well as pleasing, some scents of herbs and flowers are, is obvious to all; how great virtues they may have in diseases, especially of the head, is known to few, but may easily be conjectured by any thinking man.

"I remember that, walking in a long gallery of the Indian House of Amsterdam, where vast quantities of mace, cloves and nutmegs were kept in great open chests all along one side of the room, I found something so reviving by the perfumed air, that I took notice of it to the company with me, numbering many persons, and they all were sensible of the same effect, which is enough to show the power of smells, and the operations both upon the health and humor."

Of our five senses, that of smelling has been treated with comparative indifference. However, as knowledge progresses, the various faculties with which the Creator has thought proper, in his wisdom, to endow man, will become developed, and the faculty of smelling will meet with its share of tuition, as well as sight, hearing, touch and taste.

St. Paul tells the Corinthians "that there should be no schism in the body, but that the members should have

the same care one for another. And whether one member suffer, all the members suffer with it; or one member be honored, all the members rejoice in it; nay, much more those members which *seem* to be more *feeble, are necessary.* If the whole body were an eye, where were the hearing? If the whole were an ear, where were the smelling?" These arguments appear so conclusive in favor of a just and proper estimation of the value of smelling that it would seem impossible to neglect it without bodily suffering as a consequence.

Practically, the author has always found it so. Among the lower order, bad smells are little heeded; in fact, "noses have they, but they smell not;" and the result is a continuance to live in an atmosphere laden with poisonous odors, whereas, any one with the least power of smelling retained, shuns such odors, as they would any other thing that is vile or pernicious. In the public schools "common things" are now being taught; to complete the idea, youth must be instructed that when the nose is offended, the body will indirectly suffer. If they are not taught to know by name every odor that they smell, they can at least be made familiar with the deadly effects of sulphuretted hydrogen, and others of the putrescent gases, and so avoid them in future life.

AMBER.

This substance, though classed among minerals, is of vegetable origin, bearing evidence of having been in a fluid or viscid state. It is rather heavier than water, usually transparent when polished, but occasionally opaque or clouded; of a resinous taste, and when burning gives off a white, aromatic smoke. It possesses electric properties, which are strongly developed by friction, and which gave the name to the science of electricity, from *elektrou*, the Greek word for amber. It is much less esteemed in Europe than among Oriental nations, where the demand for ornamental purposes is very great. There it is fashioned into necklaces, ear-rings, bracelets, also into snuff boxes and the most costly kind of pipes. At various times the origin of amber has been a matter of dispute among naturalists, some describing it as an animal substance, secreted by an ant inhabiting pine forests; others maintaining it to be a fossil mineral of antedeluvian origin; and others again with greater truth, imagining it to be a resin from the pine and afterwards solidifying. This idea was entertained by Pliny, who speaks of amber as a resinous juice oozing from old pines and firs, and discharged by them into the sea. According to the recent researches of Goppert, amber is nothing more than an indurated resin, derived from various trees of the family coniferæ; which resin is found in a like condition in all zones, because its usual original depositories, viz., beds of brown coal, have been formed everywhere under similar circumstances. A convincing proof that amber was once fluid is afforded by the fact that insects, leaves, drops of clear water, or portions of metal and sand are sometimes found enclosed in it. The insects are sometimes entire, but their detached legs and wings show there was a hard struggle to escape from the viscid mass. Bees, wasps, gnats, spiders and beetles have been observed in specimens; but the species more resemble insects of tropical countries than of the temperate zone. This curious circumstance of the inclosure

of insects is often taken advantage of by dishonest dealers, who imitate it in common copal, which closely resembles amber and is often sold as the finest quality.

Amber is generally found in rounded shapes, varying in size from a small nut to that of a man's head; but the latter is very rare. Its value increases greatly with the size; thus, a piece weighing a pound would bring fifty dollars, but one of fifteen pounds would be thought cheap at five thousand dollars. Amber is chiefly obtained on sea coasts, after storms, when it is either picked up on the beach or sought after by men who walk up to their necks in the waves, with long poles to which nets are attached; or it is gathered from precipitous cliffs. The most abundant supply is obtained in East Prussia, along the Baltic Sea, between Memel and Dantzig, and especially on the shore near Konigsberg, and from Grossdirscheim to Pillan. It has also been found in Poland, Saxony, Siberia and Greenland; also in England near Norfolk, and on the Yorkshire coast. By sinking pits in sand and clay formations small quantities are occasionally procured on sandy downs. The coarser sorts are used in making durable varnishes; also by the action of nitric acid the substance called artificial musk is made. The largest pieces in the world are in the Royal Museum at Dresden.

Amber at present forms one of the most lucrative articles of commerce with Turkey, where the greater part of the European article is sold; but considerable quantities are also purchased and forwarded to this country. It is estimated that the revenue derived by Prussia from her trade in this article amounts to twenty thousand dollars per annum.

KING OF JERSEY.

The origin of the allusion to New Jersey as a foreign country is said to be as follows:

After the downfall of the First Napoleon, his brother Joseph, who had been King of Spain, and his nephew, Prince Murat, son of the King of Italy, sought refuge in this country, and brought much wealth with them, Joseph Bonaparte wished to build a palatial residence, but did not desire to become a citizen, as he hoped to return to Europe. To enable him as an alien to hold real estate required a special act of the Legislature. He tried to get one passed for his benefit in several States, but failed. He was much chagrined especially because Pennsylvania refused. After this he applied to the New Jersey Legislature, which body granted both him and Murat the privilege of purchasing land. They bought a tract at Bordentown, and built magnificent dwellings, and fitted them up in the most costly manner. Rare paintings, statuary, &c., were profuse, and selected with care, and the grounds were laid out with exquisite taste. Joseph Bonaparte's residence was, perhaps, the finest in America. Thousands of people visited it from all parts of the country, and were treated courteously. He was profuse with his money, and gave a great impetus to business in the small town. The Philadelphians finding he had apparently no end of money, and that he had used it to benefit business generally, regretted, when it was too late, that they had refused to let him locate among themselves; and, to hide their mortification, would always taunt Jerseymen with having a King—with importing the King of Spain to rule over them—

they were called Spaniards and foreigners on this account. But these taunts harmed no one, as the Jerseymen lost nothing by their alluring him to settle among them, and the term "foreigner" jokingly applied to Jerseymen, has come down to us long after its origin has been forgotten, except by a few men of the past generation. Many years ago—during the reign of Louis Phillippe, we believe—both Bonaparte and Murat found they could safely return to Europe, and they sold out and returned.

LOSS OF THE FIRST STEAMER ON THE ATLANTIC.

The first steamer ever lost on the Atlantic was the President, a steamer in size and dimensions much resembling her consort, the British Queen. She had two funnels, and sat high out of water. She made but three voyages across the Atlantic. Her first trip out to America was a tedious one. On her return passage, which commenced on the 2d of November, 1840, she encountered very severe weather, and after being out three days, during which time she had consumed a large portion of her coal, and made but very little way, she was obliged to return to New York to obtain a fresh supply of fuel. On the second attempt she made Liverpool after a rough and protracted passage of seventeen days. Her outward voyage to the United States in February, 1841, was her last. On the 10th of March of that year, the President left New York for Liverpool, with twenty-three passengers on board, and up to this day no satisfactory intelligence has been received regarding her fate. The only ship that reported having seen her was a Portuguese brig, which, on 23d April, 1841, while in lat. 31 N. and long. 40 W., saw a very large steamer under sails going at the rate of three or four miles an hour. No smoke issued from the funnels, and the paddle wheels were not in motion. The captain of the brig saw the steamer both on that and the following day, and even approached within three or four miles of her while pursuing his own homeward route. She did not hail the brig, nor did she appear to be at all in a disabled state. A British man-of-war and two Portugese vessels were sent to cruise in search of the President, but without success, and all hope for her safety was abandoned; and so ended the career of this pioneer of trans-Atlantic steam companies. The President was built at Blackwell, England, by the British and American Steam Navigation Company.

THE FIRST SCREW STEAMER.

The first screw steamer was built at Bristol, England, by the Great Western Steam Navigation Company, in 1839. It was called the Great Britain, and was built of iron, and propelled by means of an *archimedean screw*. It was originally intended to be a paddle-steamer, but the company having been unable to induce any forge-master to undertake the forging required for the paddle-shafts, necessity compelled the adoption of the screw-propeller. Although she was begun in 1839, and was so far finished as to be launched on July 19th, 1843. she was imprisoned in Cumberland Dock, Bristol, for several months, owing to the locks being narrower than the ship. After the locks being widened, she was on December 12th, 1844, released, and early in 1845, steamed round to London

on a trial-trip, proving her to be a very swift boat. Her dimensions were: Length, 274.2 feet; breadth, 48.2 feet; depth, 31.5 feet; 6 masts; gross tonnage, 2,975 tons; engines, 1,000 horse power, driving a six-bladed propeller of solid iron, 15 feet 6 inches in diameter. She made at that time but two passages across the Atlantic.

THRILLING INCIDENT IN THE LIFE OF AN INVENTOR.

Æolian Pianos.—A correspondent in the *National Intelligencer* (D. C.) notices the efforts that were made some years ago by O. M. Coleman, the inventor of the Æolian Attachment, to direct attention to it, among the musical circles of London, and concludes with the following anecdote:—

"But to bring my letter to a close. After Coleman had obtained his European patents, and his invention had attained the highest point in the estimation of the public, he still found a 'lion in the way.' The celebrated Thalberg, then and yet justly regarded as the first pianist in the world, who was then on the Continent, had not yet seen or heard the instrument. Many eminent musicians, and especially the piano manufacturers, stood aloof until Thalberg should give his opinion. Coleman felt that the fate of his invention hung upon the fiat of the dreaded Thalberg. It was—'Wait till Thalberg comes,' and 'If Thalberg says so and so, then,' &c., until the very name of Thalberg became hateful. The great master arrived in London at last, and a day was appointed for his examination of the instrument. A large room was selected, into which were admitted a number of the first musical artists.

"Benedict sat down and played in his best style. Thalberg stood at a distance, with his arms folded and back turned. He listened for a time in that position, and then turned his face towards the instrument. He moved softly across the floor until he stood by the side of Benedict, where he again stopped and listened. An occasional nod of the head was all the emotion he betrayed. Suddenly, while Benedict was in the very midst of a splendid sonata, he laid his hand upon his arm, and, with a not very gentle push, said, 'Get off that stool!' Seating himself, he dashed out in his inimitable style, and continued to play for some time without interruption, electrifying Coleman and the other auditors by an entirely new application of the invention. Suddenly he stopped, and, turning to Benedict, requested him to get a certain piece of Beethoven's from the library. This was done, and Thalberg played it through. Then, striking his instrument with his hand and pointing to the music he said:—'*This* is the very instrument Beethoven had in his mind when he wrote that piece. It has never been played before!'

"The next day Coleman sold his patent right for a sum that enabled him to take his place among millionaires."

LEAD.

When this metal was first used by man, no one can tell. It is known to have been in common use among the Romans, who sheathed the bottoms of their ships with it. At that time lead was twenty-four times the price it is now. The uses of lead are very numerous, such as for covering buildings, for water pipes, for dyeing and calico printing, in making glass for glazing porcelain, for refining gold and silver,

for pigments. White lead, red lead and yellow chrome, are known to everybody. The application of lead as a cosmetic is somewhat curious. The Roman ladies were wont to "paint" with ceruse (oxyd of lead). Plautus, an old poet, introduces a waiting-woman refusing to give her mistress either ceruse or rouge, because, in the true spirit of a flatterer, she thought her quite handsome enough without it. The best hair dyes are made with lead.

The quantity of sheet lead used for wrapping tea, tobacco and perfumery goods is enormous. It is remarkable that this metal, when dissolved in an acid, has the property of imparting a saccharine taste to the fluid. Thus, the common ascetate of lead is always called "sugar of lead." It was, perhaps, on this account that the Greeks and Romans used sheet lead to neutralize the acidity of bad wine — a practice which now is happily not in use, since it has been found that all combinations of lead are poisonous. Lead will take off the rancidity of oil, and on this account it is much valued by watchmakers for making their lubricating oil. The alloys of lead, which we call pewter, solder, and others, are so essential in every-day life that we should be in a regular "fix" without them. "As heavy as lead" is a proverb which brings to our mind its weighty quality, which is of great importance, for it enables us to ascertain the depths of the ocean; and without we could do this, how could we lay down the telegraph cables? How ascertain the presence of those dangerous banks which upset the vehicles of the mighty deep? Thus we perceive that one material is subservient to another, till that great unity is produced which we call the world.—*Septimus Piesse.*

MANAGEMENT OF GOLD FISH.

It is said that gold fish may be kept ten or twelve years (their average period of existence,) in vessels by the following precautions:

1. Allow not more than one fish to a quart of water.

2. Use the same kind of water, whether spring or river water, and change it daily in summer, every other day in winter.

3. Use shallow rather than deep vessels, with small pebbles at the bottom (to be kept clean), and keep them in the shade and in a cool part of the room.

4. Use a small net rather than the hand while changing the water.

5. Feed them with cracker, yolk of egg, lettuce, flies, etc., rather than with bread, and then only every third or fourth day and but little at a time.

6. Do not feed them at all from November to the end of February, and but little during the three following months.

PLATINUM.

The heaviest and the lightest substances with which we are acquainted possess the properties which chemists recognize as "metallic." The lightest substance we know is hydrogen and although a gas is yet presumed, with good reason, to be a volatile metal. Platinum is remarkable as being the heaviest of all the elements which constitute the world. If we take a certain bulk of lead weighing one pound, and the same bulk of platinum, we shall find that the latter will weigh more than one pound and three quarters. It is now about a hundred years since Europeans became acquainted with platinum through Mr. Wood, Assay-

master of Jamaica. The sandy beds of the rivers which have their rise in that portion of the Andes which separates the Atlantic (near the Carribean Sea) from the Pacific Ocean, yield gold, silver and platinum, and many other metals.

Near Carthagena, a city of South America, in the republic of New Granada, is a famous mine called Santa Fe. From this place most of the platinum of commerce is procured, but it is also found in the Brazils, Mexico, St. Domingo, and the eastern declivity of the Ural mountains in Russia. It is also found in Borneo, and will probably be discovered in Australia, if proper search be made for it. By some extraordinary process, the laboratorian chemists can liquify this metal; but it cannot be melted by the strongest blast-furnace, nor by any of the appliances in ordinary use by metal-workers; hence it is said to be infusible; and did it not possess that property called welding, that is of uniting or adhering together when squeezed or hammered at a white heat, it would be almost useless. As, however, it can be welded, various useful vessels are made of it; and thus we find that it has qualities peculiar to itself.

No single acid will dissolve it; and hence its very refractory nature render it invaluable to philosophers. In a platinum crucible they can submit other substances to experiments either with fire or chemicals without any fear of modification from the containing vessel.

Magic, according to the lexicographers, is "the secret workings of natural powers." Such being the case, platinum is truly magical, for it possesses a property or power, the secret of which we are unable at present to define, which singular quality has been brought into practical use by the manufacturing perfumers. At several of the perfumery factors' warehouses may be seen what they call the "Philosophical Incense Lamp," which is a marvelous realization of "Aladdin's Wonderful Lamp," so graphically described in the Arabian Nights' Entertainment. This lamp once ignited will never go out unless purposely extinguished, provided of course that there be material to consume. This property is due to a little platinum ball placed in the wick, which once being made red-hot with the flame will remain incandescent to the end of time. It is this property which is a still unexplained secret of nature. The incense lamps are trimmed with sweet-smelling spirit, and the red-hot platinum causes this to evaporate, thus perpetually flinging fragrance around. Some few years ago platinum was used in Russia as money, and stamped as coin of the realm. Why it was abandoned we are unable to learn. Should there be any future scarcity of gold or silver, it is probable that platinum will again be used as a medium of exchange. If a stream of water, passing steadily through a pipe of a certain size, were suddenly caused to flow through another pipe joined to it of half the size, nothing more would be noticed than that the water in the smaller pipe would flow with increased velocity; but if a current of electricity, while passing along a copper wire, be made to pass over a smaller one, or link of platinum wire, then a marvelous effect takes place; the platinum becomes red-hot!

In this way—for igniting gunpowder at a distance, and blasting rocks—engineers find platinum of the greatest service.

ABOUT CANES.

Since 1851, commerce in ordinary walking sticks has been quadrupled. In Hamburg, Berlin and Vienna — the present central depots for export — the manufacture employs many thousands of work people. Its control is in the hands of Jews. A writer in *Harper's Magazine* says that the Meyers, members of one family of German Hebrews, are at its head in Austria and Germany proper, and by management peculiar to their race have absorbed all competition. First gaining ascendancy at home by the style and cheapness of their wares, they next assailed foreign markets. In Bombay they undersold the Chinese dealers. Scattering thin, light bamboo rods along the overland route to India, the native productions in Egypt and Arabia gave place to the more convenient Vienese manufacture. The French occupation of Algiers introduced their graceful walking sticks to the Moorish gentry of Northern Africa. Paris began to adopt them. Madrid, Naples, and even London, followed. They drove the English canes out of the Brazils; and on the Western coast of South America, where Belgian manufactures had enjoyed immemorial monopoly, they found a demand which it taxed all their resources to supply. Curiously enough, California, in the use of the Vienese walking cane, preceded the Eastern States. Mine explorers and gold diggers of the Sierra Nevada country gave *ton* to fashion in New York and Chicago. The importation of the Meyers cane at the present time into the United States has swallowed up, like Aaron's serpent, all others. They are found everywhere. No Jew clothes man fails to keep them among his stock of goods. Light French ratans, heavy English crab sticks, the curiously carved Brussels thorns, and even the choice Alcasian orange sticks, have disappeared. The Jew specialty always succeeds, and the walking stick, manufactured now for thirty years by the Meyers, millionaires, furnishes no exception.

In the present manufacture of canes great quantities and varieties of materials are consumed. There is scarcely grass or shrub, reed or tree, that has not been employed at one time or another. The black thorn and crab, cherry tree and furzebush, sapling oak and Spanish reed *(Arundo donax)* are the favorites. Then come supple-jacks and pimentoes from the West Indies, ratans and palms from Java, white and black bamboos from Singapore, and stems of the bambusa — the gigantic grass of the tropics — from Borneo. All these must be cut at certain seasons, freed from various appendages, searched to discover defects, assorted into sizes, and thoroughly rid of moisture. A year's seasoning is required for some woods, two for others. Then comes the curious process of manufacture. Twenty different handlings hardly finish the cheapest cane. The bark is to be removed after boiling the stick in water, or to be polished after roasting it in ashes; excrescences are to be manipulated into points of beauty; handles straightened and shanks shaped; forms twisted and heads rasped; tops carved or mounted, surfaces charred and scraped, shanks smoothed or varnished, and bottoms shaped and ferruled. Woods, too, have to be studied, lest chemical applications that beautify one might ruin another kind. Some are improved under subjection to intense heat, others destroyed. Malacca canes have frequently to be colored in parts so that

stained and natural surfaces are not distinguishable; heads and hoofs for handles are baked to retain their forms; tortoise shell raspings are conglomerated by pressure into ornamental shapes, and lithographic transfers, done by hand, are extensively used upon walking sticks for the Parisian market.

LISLE THREAD.

Lisle thread proper is prepared from *pure cotton*—the finest staple that can be had, the best quality of Sea Island being generally used. The peculiarity of this thread is its hard finish and the peculiar twist or manipulations which it undergoes before being ready for use. Each thread or strand passes through a flame, which divests it of all attaching fiber. This thread is also more elastic than the finest linen thread and breaks less. It derives its name from Lisle a town in France, where it was firstmanufactured toany extent, and, like many of the industrial arts, was originally brought from the East. It is now not only extensively produced in France, Belgium, and in other portions of Continental Europe, but in Great Britain as well, and is sometimes known as "Scotch Thread."

HORSE SHOES.

History does not reach back to a period when the horse was not a companion and servant to mankind; and in the earliest periods of which we have any reliable record, the ingenuity of men was taxed to invent trappings for the decoration, and armor for the protection of this noble animal, whose services in war are no less conspicuous than his patient labor in peaceful avocations is indispensable alike to civilized and barbarous races.

Precisely when the foot of the horse began to be protected by some form of shoe is unknown, but the necessity for it must have arisen with artificial roads, or when it was found necessary to employ the animal in traversing rocky wastes.

The anatomy of the horse indicates that his natural haunts are broad and grassy plains, where his fleet foot may spurn the yielding turf without injury and where an ample supply of his favorite forage may be found.

In this state he may now be found on the extensive table-lands of Texas, and the *pampas* of Mexico, where his feet need not the assistance of veterinary art.

The Greeks and Egyptians practiced horse-shoeing in a manner which, so far as can be ascertained, consisted of applying a kind of sock or sandal, fastened about the leg with straps, and shod with iron or other metal, for strength and extra wear. These were probably not generally employed, but were used only in cases of disease or injury. It is highly probable that the primitive horseshoes were made of raw hide, stitched or laced upon the foot.

The ancient Britons do not seem to have known the art of horse-shoeing. The first indications of this practic, so far as archæologists have been able to discover in England, belong to what is known as the Romano-British period. There is, therefore, little doubt that horse-shoes were introduced into England by the Romans.

Specimens of these horse-shoes, more or less preserved, have been unearthed in various localities. They appear to have been without toe-calks, but have heel-calks like our modern horse-shoes. They have mostly three nail holes in each branch of the shoe, and instead

of a groove in each branch, like the shoes of the present day, have large oval depressions for the heads of the nails. These depressions were evidently stamped in while the iron was hot, which operation spread the metal so as to form three distinct scallops on each side of the shoe.

The Anglo-Saxon horse-shoe was, in its earliest forms, a cumbrous and ill-shaped affair, not comparable in regularity of form to the Roman shoe; but its outer edge is not scalloped like the Roman shoe.

The art of horse-shoeing was considered of the first importance by the Normans, and those who excelled were employed in the royal establishment, and endowed with landed estates and titles of honor.

The efficiency of the horse in battle and his usefulness in times of peace, depending as they do in so great a measure upon his being properly shod, justify the importance attached to this art in mediæval as well as modern times. The saying of "Poor Richard," "For want of a nail the shoe was lost; for want of a shoe the horse was lost; for want of a horse the rider was lost;" has been verified in many a retreat, and many a traveler has been exposed to imminent peril by the loss of a shoe from the foot of his horse.

That interest in the further improvement of the horse-shoe is not yet extinct is proved by the fact that we have illustrated and described within the past year or two several improvements of this kind, and a glance through the records of the Patent Office will show that nearly every year brings forth something of this sort. It is within the last quarter of a century that the extensive manufacture of horseshoes by machinery has been originated and developed, and the article has been much cheapened thereby. Thus this ancient device has probably not yet reached a point beyond the scope of inventive genius and skill, and the time may come when the manufacture of malleable cast iron may be so perfected as to enable them to be cast at much less than their present cost, and of as good quality as those now made of wrought iron by machinery.

NEEDLES.

In 1370, needles were manufactured at Nuremburg.

There seems to be some doubt about the date of the introduction of the needle into England. Stow says that needles were not sold in Cheapside till the reign of Queen Mary, and that they were then made by a Spanish negro, who refused to disclose the secret of his art. Another authority says that they were first made in England by a native of India in 1545, but the art was lost at his death. The *Encyclopedie des Gens du Monde* says that the first metallic needle factory in England was established in 1543. We may, however, be quite sure that the needle in its present form had been introduced into England prior to 1553, for we hear of its use by the Lady Elizabeth at Woodstock in that year, and the result of her labors, the embroidered back of a book, is at present in the Bodleian Library at Oxford.

Whether or not the art of manufacturing needles was really lost at the death of the "native of India," it seems to be quite clear at all events, that no extensive centre of manufacture had been established till 1650. In that year, Mr. Damar, an ancestor of the Milton family, settled at Long Crendon, in Buckinghamshire, Chris-

topher Greening and his three children. This little family, doubtless assisted by the benevolence of their patron, set up a small needle factory, which, if it do not exist at the present day, certainly was carried on until very recently. At present Worcestershire is the chief seat of the needle manufacture, but even in this case it is not at all clear when Redditch became the centre of the trade. There are slight indications, it is said, of Redditch needle-making for a period of nearly two centuries, but beyond that all is blank. There are no particular advantages offered by the situation other than that common to many spots, of being near to the seat of the English iron trade.

Respecting the changes which have occurred in needle manufacture, it may be interesting to mention the apparatus designed with the view of obviating the inconvenience caused by the dust generated in the grinding process. It is notorious that this fine mixture of metal and sandy particles is productive of serious consequences to the health of the work people, and as far back as the year 1811, the English Society of Arts bestirred itself to find a preventive.

In the same year the silver medal of the society was voted to Mr. Thomas Wood, of Great Barkhampstead, for his improved grindstone for pointing needles. It was nothing more than an ordinary grindstone provided with a hood or case in which was a pane of glass to enable the operator to watch his work. The current of air formed by the motion of the stone was confined within the case, and carried with it the fine particles, which it deposited on the lower part of the inside of a wet cloth which formed the connection between the sides of the case.

WHERE THE APOSTLES REST.

Catholic authorities state that the remains of the apostles of Christ are now in the following places: Seven are in Rome—namely, Peter, Philip, James the Lesser, Jude, Bartholomew, Matthias and Simon. Three are in the kingdom at Naples, Matthew at Salerno, Andrew at Amalfi, and Thomas at Ortano. One in Spain, James the Greater, whose remains are at St. Jago de Compostella. Of the body of St. John, the evangelist, the remaining one of the twelve, there is no knowledge. The evangelists, Mark and Luke are also in Italy—the former at Venice and the latter at Padua. St. Paul's remains are also believed to be in Italy. Peter's are, of course, in the church at Rome, which is called after him, as are also those of Simon and Jude. Those of James the Lesser and of Philip are in the Church of the Holy Apostles; Bartholomew's in the church on the island in the Tiber, called after him; Matthias's are in Santa Maria Maggiore, under the great altar of the renowned Basilica.

HISTORY OF PINS.

Pins formed of wire seem to have been unknown in England till about the middle of the 15th century, before which time they were larger than the present pin, and were made of boxwood, bone, ivory, and some few of silver. Metal pins had, however, long been matters of history. In the Egyptian tombs they are frequently found, and are much more elaborate and costly than those produced to suit modern requirements. They vary in length up to 7 or 8 inches, and are furnished

sometimes with large gold heads, and sometimes with a band of gold around the upper end, those of the latter kind having probably been used for securing the hair. The ancient Mexicans were familiar with their use, but they also found a convenient substitute in the thorns of the agave. About the middle of the 15th century metal pins were in use to a small extent in this country, and we hear of Catherine Howard importing them from France somewhere about the year 1540. The importation of pins really dates much further back, for in 1483 it was made the subject of a prohibitory statute. In 1543, another act, passed in the reign of Henry VIII., provided "that no person should put to sale any pinnes but only such as shall be double headed, and have the heads soldered fast to the shank of the pinnes, well smoothed, the shank well shapen, the points well and round, filed, cauted and sharpened."

Within three years from this date, the manufacture was so much improved that the enactment became of little value. It is very probable that the imported pins were the cause of this manifestation of government interference. The best pins were made of brass, but in France it had become very general to manufacture pins from iron wire, which, being blanched like the others, passed for brass. The pins so made were very defective, and in a little time their use was confined to the continent. The French especially could with difficulty be prevailed upon to discard them, and even as late as 1695 it is recorded that the seizure of some millions of the faulty pins by order of the lieutenant of police was confirmed by the parliament, and the whole quantity was ordered to be burnt by the common executioner.

The manufacture of pins was started in Gloucestershire, England, by John Tilsby, in 1626, and the business soon proved so prosperous that it gave employment to 1,500 persons. Ten years later it was established in London. About the middle of the last century, wire-drawing and pin-making were commenced in Birmingham by the Rylands family, who carried on most successfully this branch of industry. So much of the business as related to pins was transferred about 1785 by Mr. Samuel Rylands to his nephew, Mr. Thomas Phipson, and this manufacture has since been continued by the present firm of Thomas Phipson and Son.

The trade gradually improved, but without any remarkable impetus, until 1824, when Mr. Lemuel W. Wright, a native of Massachusetts, patented in Great Britian an important machine of his own invention, which is often believed to have been the first ever contrived for making solid headed pins. Mr. Wright introduced his machine to the public in London, where it was worked at a factory in Lambeth. The enterprise was not successful, and the company failed before the new pins could be brought into the market. The machinery was then transferred to Stroud, in Gloucestershire, the county where the trade had been originally introduced two centuries before, and here the manufacture was conducted by Messrs. D. F. Taylor & Co.

The first solid headed pins were sold by this firm, in London, somewhere about the year 1833.

A. T. Stewart testified under oath that he had never seen laces worth more than $250 per yard, and that the modern article is more valuable than the ancient.

CLOCKS.

Clocks may be considered a modern invention. Even within a few years great improvements have been made in their manufacture by which they may be ranked among the commonest articles of household convenience because of their cheapness, while at the same time their value as accurate timepieces is not impaired. This result is due to the employment of machinery instead of hand labor in their construction, by which rapidity, exactness, and the reduplication of parts is secured.

The first time-measurers of which we have any historical knowledge were sun-dials, similar probably to those now used merely as curiosities. But before that period, time was undoubtedly measured by the observation of natural objects, particularly the relative length of shadows cast by fixed objects. In the book of Job, one of the oldest of preserved writings, he refers to this mode of measuring time when he says, chap. vii, 2–4 :—

As a servant earnestly desireth the shadow and as a hireling looketh for the reward of his work, so am I made to possess months of vanity and wearisome nights are appointed to me. When I lie down I say, When shall I arise and the night be gone. And I am full of tossings to and fro unto the dawning of the day.

This custom has obtained even to our own days. Many now living remember how, in the country, where no more reliable means were at hand, the dinner hour and time for ceasing labor on the farm were determined by the length of shadows cast by familiar objects. The sun-dial, however, in some shape, has been used for many centuries. We remember when in the school room we watched lines on the window sill, scratched with a pocket knife, to cheer the tedium of the "hope deferred" by anticipating the welcome hour of dismissal, or the time of recess.

An improvement on the sun-dial was the clepsydra, a vessel containing water which found its way, drop by drop, through a minute aperture. These water clocks appear to have been a very early invention. They were used by the Chaldeans, and introduced into Europe by the Romans. The hour-glass was a great improvement and was used within the memory of persons now living, as measurers of time, especially in the school room, and these cannot forget the couplet in the "New England Primer"—

"As runs the Glass,
Our life doth pass."

Sand glasses registering three or four minutes are now used as attachments to egg-boilers, and also at sea for some nautical calculations.

We have no certain data for fixing the invention of clocks which were in any degree similar to those now used. Indeed, the only characteristics of these early time-measurers which they have in common with ours, is that they had wheels, one or more pointers, or a bell, and were moved by weights. Such or a similar machine is spoken of as being sent to Frederic II. by the Sultan of Egypt. Calmet in speaking of the customs of the Cisterian monks in 1120, alludes to the striking of the clock to awaken them to attend to their devotions. Dante, who died in 1321, speaks of the striking of a clock. About 1364, Henri de Wyck, a German mechanician, erected a clock in the palace of Charles V. of France. Most of the historical evidence which is reliable seems to point to this period as the first introduction of clocks, and to the fact that the Germans were the most successful clock makers.

The discovery of the isochronism of the pendulum by Gallileo and its application to the regulation of clock work by his son Vincenti, appears to have been the starting point from which the art of horology has reached its present state of perfection. Christian Huygens, however, seems to deserve credit for constructing pendulum clocks, which were really valuable and reliable, although Richard Harris, of London, claims to have antedated the improvements of Huygens by sixteen years, he having used the pendulum successfully in 1641, while Huygens claims are dated 1657.

To come nearer to our own times, who has not seen the Dutch clocks generally brought to this country by English and German emigrants? They had no cases, only a dial, behind which were the works, the whole being suspended from a nail on the wall near the ceiling. The weights hung by strings, and could descend to the floor, while the clock was wound up by pulling a cord. Still later we have the long-cased clock, so beautifully characterized by Longfellow in his poem, "The Old Clock on the Stairs."

Somewhat back from the village street
Stands the old-fashioned country seat ;
Across its antique portico
Tall poplar trees their shadows throw,
While from its station in the hall
The ancient timepiece says to all :
Forever — Never —
Never — Forever.

Halfway up the stairs it stands,
And points and beckons with its hands
From its case of massive oak,
Like a monk, who, under his cloak,
Crosses himself, and sighs, alas!
With sorrowful voice to all who pass,—
Forever — Never —
Never — Forever.

These old clocks had pendulums beating whole seconds and running eight days, both of which were provided for by the length of the case, which extended from the floor to the ceiling, at least in low ceiled houses, being six or seven feet high. The story of the suitor who hid in the clock case from the prying investigation of the irate father is familiar to all. Many of these old-fashioned clocks showed, in a semi-circle above the face, the changes of the moon, and all were ornamented with quaint pictures on glass. To many of our readers this brief reference to the old-fashioned clock will bring a recollection of pleasant seasons and scenes not to be again enjoyed or viewed.

WATER-CLOCKS.

Bowls were used to measure time, from which water, drop by drop, was discharged through a small aperture. Such bowls were called water-clocks (*clepsydrae*). It was then observed how much water from such a bowl or cask, from sunrise till the shortest shadow, trickled down into another bowl beneath ; and this time being the half of the solar day, was divided into six hours. Consequently they took a sixth of the water which had trickled down, poured it into the upper bowl, and, this discharged, one hour had expired. But afterward a more convenient arrangement was made. They observed how high the water at each hour rose in the lower bowl, marked these points and counted them, thus finding out how many hours there were till sunrise. With the Chinese, water-clocks, or clepsydras, are very old. They used a round vessel, filled with water, with a little hole in the bottom, which was placed upon another vessel. When the water in the upper vessel pressed down into the

lower vessel, it subsided by degrees, announcing thereby the parts of time elapsed.

The Babylonians are said to have used such instruments; from them the Greeks of Asia Minor got them, at the time of King Cirus, about the year 550 before Christ. But the Romans did not get the first water clock before the year 160 before Christ. But though the hours of the clepsydra did not vary in length, they still counted them from the morning. When the clock with us strikes seven, the ancients counted one; when the clock with us strikes twelve, the ancients counted six, and so forth. This method of counting the hours was, according to the New Testament, also customary in Palestine at the time of Christ. The water clocks had that advantage, that they could be used in the night; and the Romans used them to divide their night-watches, which were relieved four times, both Summer and Winter. Conformably to these four night watches, time was counted, not only in Rome, but wherever Roman garrisons were stationed; consequently, also in Palestine, after she had become a Roman province. The first night watch was called *vespera,* (evening,) from sunset to 9 o'clock; the second, *media nox,* (midnight,) from 9 to 2 o'clock; the third, *gallicinium*, (cock-crowing,) from 2 to 3 o'clock; and the fourth, *mane* (morning,) from 3 o'clock to day break.

ORIGIN OF THE CONNECTICUT CLOCK BUSINESS.

Bishop, in his "History of American Manufactures," says that the wooden clock manufacture was commenced in Waterbury, Conn., by James Harrison, in 1790, on whose books the first is charged January 1, 1791, at £3 12s 8d. In East Windsor the brass clock manufacture was carried on by Daniel Burnap. Specimens which are still preserved are said to be nowise inferior in workmanship to the best English clocks of that or any later period. Clocks were also made in East Hartford by a Mr. Cheeny. In 1793, Eli Terry who had been instructed in the business as practiced by him and Cheeny, removed from East Windsor, where he had carried on clock-making, to Plymouth, in Litchfield County. His subsequent enterprise and improvements in the art in that place entitle him to be considered the parent of the manufacture in Connecticut. At that time, Thomas Barnes, of Litchfield, and Gideon Roberts, of Bristol, were also known as clock-makers. The kinds of clocks made by these were brass and wooden clocks, with long pendulums, and their price was, for a wooden clock and case, from $18 to $48, the higher priced ones having a brass dial and dial for seconds, and the moon's age, and a more costly case. Brass clocks with a case, cost from $38 to $60. So limited was the sale at those prices, that three or four hundred constituted a stock in trade, and they were carried out for sale by the maker on horseback, the case being procured by the purchaser at from $5 to $30, according to his taste.

Terry made both kinds, using a hand engine for cutting the teeth of the wheels and pinions, and a foot lathe for the turned work. In November, 1797, he patented an improvement in clocks, watches and time pieces, covering a new construction of an equation clock, showing the difference between apparent and mean time. In 1802, in which year Willard, of Boston, took a patent for his time pieces, Terry

began the business on a larger scale, by water power, and, five or six years after, his success in making them by the thousand, which had been ridiculed as chimerical, enabled him greatly to extend the manufacture, which others now commenced on the wholesale system.

In 1814, he introduced a new era in the business, by commencing on the Naugatuck river the manufacture of the shelf or mantel clock, which he patented in 1816. The cheapness of these created a wide demand. Several improvements made by him in the mechanism, and the later progress in machinery generally, have increased the annual production in that State to hundreds of thousands, and given to every household a clock, equal to the old ones, at a cost of $2 and upward. His descendants have been engaged in the business to the present time, and his pupil, Chauncey Jerome, since 1821.

Apart from the importance of horological machines in every department of life, and especially in relation to science and business, there are few of the mechanic arts which have furnished more numerous and striking examples of great and useful inventions among its members than the clock and watch making business. Many, both in Europe and America, have first exercised in this way their ingenuity, which has afterward conduced to discoveries of universal utility. Rittenhouse, Fitch, (also a native of Connecticut), Whittemore, who, before any of the above, also constructed without a model, an efficient wooden clock, Dr. Franklin, and others, might be named. Clock-makers are said to have been the first who employed *special machines* for their manufactures. the wheel-cutting engine having been invented by Dr. Hooke about 1655, and the screw-cutting lathe by Hindley, a clock-maker of York, England, in 1741. The fusee engine and slide rest, the value of which are known to all mechanicians who use metal, are of a later introduction, although the latter, in an imperfect form, was used at Rome in 1648, and attained its present form in 1772.

The Assembly of Connecticut, in October, 1783, awarded a patent for fourteen years to Benjamin Hanks, of Litchfield, for a self-winding clock. It was to wind itself by the help of the air, and to keep more regular time than other machines. The principle was made use of in New York and elsewhere.

GEN LAFAYETTE'S WATCH.

It is doubtless within the recollection of many in this city that in the year 1824, General Lafayette made a tour of this country, attended by such an ovation as offered, perhaps, the grandest spectacle of a nation's tribute to a hero the world has ever seen. During his tour, while on a visit to some town in the State of Tennessee, the General was mysteriously robbed of his watch, a valued souvenir, which had been presented to him (in 1781) by General George Washington, to commemorate at once the affectionate relations which had long existed between them, and his gallant services at the siege of Yorktown, the crowning event in the struggle for American independence. Directly upon the robbery becoming known, most strenuous efforts were made for its recovery, but, despite the fact that the Governor of Tennessee offered a reward of one thousand dollars for its return, not the slightest trace of it was thereafter

obtained, and General Latayette was eventually compelled to return to France, resigned to the thought that the precious gift of his dear friend was lost to him forever.

The years passed on, and with their lapse men's recollection of the circumstances faded away. Lafayette died in 1834, and for a space of forty-eight years the stolen watch bore an unknown history. At the end of that time, but a few days ago, a gentleman residing in this city, while visiting Louisville, attended an auction sale at a junk shop, where, strange to relate, he found among the articles offered, a watch, which, upon examination, he discovered to be the long-lost watch of Lafayette.

Suffice it to say that he eagerly purchased it, and as quickly formed the resolution to transmit it to the family of General Lafayette, now residing in Paris; pending which transmission, however, the gentleman has brought it to his home, and has consented to its exhibition for a few days at E. A. Tyler's jewelry store, on Canal street.

The watch is open-faced, of gold, with a double case, and may be remarked as of a peculiar appearance, being of only ordinary size, but nearly as thick as it is wide. The outer case bears upon its entire surface carved figures, in *bas relief,* representing the picture of Mars offering a crown to the goddess of Peace, who is surrounded by her emblems, while over all appear the stern implements of war, hung high out of reach. On the inner case appears the yet clearly legible inscription:

G. WASHINGTON
TO
GILBERT MARQUIS DE LAFAYETTE,
Lord Cornwallis's Capitulation,
YORKTOWN,
Decb'r 17, 1781.

On the covering of the works is seen the maker's name—E. Halifax, London, 1759.—*New Orleans News.*

The United States Government has since purchased this watch, and presented it to the only living lineal descendant of Lafayette. The presentation was made in Paris by the American Minister, Mr. Washburne.

THE WATCH.

"Watch" is from a Saxon word signifying "to wake." At first the watch was as large as a saucer; it had weights, and was called "the pocket clock." The earliest known use of the modern name occurs in a record of 1542, which mentions that Edward VI. had "onne larum or watch of iron, the case being likewise of iron-gilt, with two plumettes of lead." The first great improvement, the substitution of the spring for weights, was made about 1550. The earliest springs were not coiled, but only straight pieces of steel. Early watches had only one hand, and required winding twice a day. The dials were of silver or brass; the cases had no crystals, but opened at back and front, and were four or five inches in diameter. A plain watch cost the equivalent of $1,500 in our currency, and after one was ordered it took a year to make it.

There is a watch in a Swiss museum only three-sixteenths of an inch in diameter, inserted in the top of a pencil-case. Its little dial indicates not only hours, minutes, and seconds, but also days of the month. It is a relic of the old times, when watches were inserted in saddles, snuff boxes, shirt studs, breast-pins, bracelets and finger rings. Many were fantastic—oval, octangular, cruciform, or in the shape of pears, melons, tulips, or coffins.

WHO MADE THE FIRST WATCH.

Watches were made at Nuremburg, Bavaria, in the beginning of the 16th century by Peter Hele. The first record of watch-making is found in the works of Johannes Coccianes, who, in 1511, wrote the following: "Ingenious things are just now being invented; for Peter Hele, as yet but a young man, hath made works which even the most learned mathematicians admire; for he fabricates small horologies of iron filled with many wheels, which whithersoever they are turned, and without any weights, both show and strike forty hours, whether they be carried in the bosom or the pocket." It took a year to make one, and a plain one would cost about $1,500.

ABOUT CORAL.

The Greeks named coral the "daughter of the sea;" and Theophrastus reckons it among the precious stones. Pliny tells us that coral was no less esteemed in India than were pearls in Rome, "it being the prevailing taste in each nation respectively that constitutes the value of things," he observes. "Solimus informs us," so he continues, "that Zoroaster attributed certain mysterious properties to coral; hence it is that they equally value it as an ornament and as an object of devotion."

In Persia, China and Japan, coral was prized almost as much as gold. The Gauls in ancient times were accustomed to ornament their armor with this lovely product of the Gallic and Italian seas; but finding the value of it as an article of exportation, it soon became comparatively rare in the countries where it at first abounded.

Pliny describes coral as a marine plant, bearing crimson berries; nor can we wonder that he should have been led into this mistake when we find the error repeated almost down to our own times. In Johnson's Dictionary is the following definition: "Coral, a plant of great hardness and stony nature while growing in the water as it is after long exposure to the air."

Coming down to the mediæval age, the first mention we have of coral is in the inventory of Alianore de Bohun, where a paternoster of coral with gilded gaudier, and three branches of coral, are among the list of valuables. Quite as many superstitious beliefs were then attached to this supposed submarine plant as in a more remote period. Reginald Doot, in his Discoveries of Witchcraft, tells us that "the coral preserveth such as wear it from fascination or bewitching, and in this respect they are hanged about children's necks." Plat, in his Jewel House of Nature, repeats the same story, adding that it preserves from the falling sickness. "It hath also some special sympathy with nature," he continues, "for the best coral being worn about the neck will turn pale and wan if the party that wears it be sick, and comes to its former color again as they recover health."

In 1670, Tournefort described coral as a plant; and Reaumur declared it as his opinion, but slightly differing from other naturalists, that it was a stony product of marine plants. The Count di Marsigli went a step further, and not only asserted the vegetable nature of coral, but declared that he had seen its flowers! In his work *La Physique de la Mer*, he gives a representation of these sea blossoms, thus setting the question at rest forever, as it is supposed. Others, however, were

not quite so well satisfied; and in 1723, Jean Andre de Peysonnel, a student of medicine and natural history, was deputed by the French Academie des Sciences to make further observations in elucidation of this interesting subject. He began his examinations first in the neighborhood of Marseilles, and continued them on the north coast of Africa. At last, after long, exact and delicate observations, he came to the conclusion that the Count di Marsigli's flowers were animals, and demonstrated that the coral was no plant, but the product of a colony of polypi. Let him describe his experiment in his own words:

"I put the flower of the coral in vases full of sea-water, and I saw that what had been taken for the flower of this pretended plant was, in truth, only an insect like a little sea-nettle or polype. I had the pleasure of seeing move the claws or feet of the creature; and having put the vase full of water which contained the coral in a gentle heat over the fire, all the small insects seem to expand. The polype extended his feet, and form what M. di Marsigli and I had taken for the petals of a flower. The calyx of this pretended flower, in short, was the animal which advanced and issued out of its shell."

But after all Peysnonel's labors, he received neither reward nor thanks for his discovery; it was ridiculed by Reaumur and Bernard de Jessieu, as something quite unworthy of credit.

THE ANTIQUITY OF INVENTION.

The most ancient invention is that of the needle. Whether the credit of this invention is due to Adam and Eve, we know not, but we do know that the Bible says "they sewed fig-leaves together, and made themselves aprons." To sew without a needle would be an impossibility, therefore they must have invented one; whether from a thorn, shay-stick, or fish-bone is also a matter of doubt. How ancient then, is the trade of dress-making; and when we look at the fashionably dressed woman of to-day, and reflect that all her dress, finery, etc., is the result of the combined thought, industry and perseverance of dress-makers for nearly 6,000 years, is it to be wondered that she is "fearfully and wonderfully made?"

To Noah is attributed the invention of wine, 2347, B. C. Ale was known at least 404, B. C., and beer was mentioned 401, B. C. Backgammon, the most ancient of our games, was invented by Palamedes of Greece, 1224, B. C. Chess is of later date, and originated 680 years before the Christian Era. The first circus was built by Tarqin, 605, B. C., and theatrical representations took place as long as 562, B. C. The first tragedy represented was written by Thespis, 556, B. C. So it seems that the ancients were not as destitute of amusements as one would suppose. Is it not possible that the philosopher, Socrates, delighted in chess; that Sophocles amused his little friends by taking them to see the gladiators and the tragedians, and that even immortal Homer could play a fair game of backgammon?

As for musical instruments they possesed the psaltry, harp, lute, and the most ancient instrument, the cymbal, which is spoken of as long ago as 1580, B. C. The flute was the invention of Hyaginus, 1506, B. C.; organs were invented by Archimedes, 220, B. C.; and Nero played upon the melodious bagpipe 51, A. D.

In household furniture, glass was used by the Egyptians and Greeks,

1490, B. C.; carpets were in use 800, B. C.; clocks which measured time by the falling of water were invented 157, B. C.; sun-dials,which had been in use previous to the invention of water-clocks, date from 550, B. C.

Bricks were made 2247, B. C.; the lathe was invented by Talns, 1240, B. C.; the compass was used by the Chinese 1115, B. C.; bellows are the invention of the Anarcharis, 569 years B. C.

But when we think that bread made from wheat was known to the Chinese 3860 years ago, we must confess that it is rather stale. We can imagine the young "heathen Chinee" of that date crying lustily for bread and honey. These Chinese are a wonderful people and no mistake, for even as far back as 1100, B. C., Mr. Paout-she wrote a dictionary containing forty thousand characters representing words.

CAMEOS.

There is great uncertainty as to the origin of the word *cameo* or *camaieu;* some of the learned tracing it to the Arabic *camaa,* an amulet; others supposing it to be derived from *chama,* a shell used by workers in cameo; others, again, giving it an Italian origin. The term, however derived, in modern languages has always been applied to a gem, stone, or shell carved in relief, in contradistinction to *intaglio* or engraving *in cavo;* though usually understood to signify a medallion with figures raised in relief upon a ground of a different color.

Cameos were highly prized by the ancients; the glyptographic art being brought to the utmost state of perfection in the palmy days of Greece, at the same time with the arts of architecture and sculpture. The names of a few ancient gem-engravers have been handed down to us. We hear of Cronius and Apollondides; and of Pyrgoteles, who lived in the time of Alexander the Great, and was employed by him both as a seal-engraver and worker in cameo. There are but few undoubted Greek cameos extant; one of these—having for its subject Cupid playing on a lyre—is inscribed with the name "Plotarque."

Stones such as agate, onyx and jasper, used for cameos, are not indestructible, like the gems on which signets are engraved, but, on the contrary, are extremely liable to be split or chipped. Work in relief, moreover, if buried in the ground with other *debris*, becomes injured and defaced; this will account for the small number of antique cameos remaining. Of shell cameos, there is only one Greek specimen existing—the head of a nymph found in a vase at Vulci. This one specimen is, however, quite sufficient to prove that carving on shells was practiced by Greek artists. The frailty of the material renders it little surprising that no others have been discovered.

Cameo-cutting was an art much esteemed in the Augustan age, when Greek artists were encouraged to settle in Rome in order to supply the demand for these beautiful ornaments. Cameos have always been truly *objets de luxe*, and were used among the Romans not only to decorate their persons, but the service of their table, especially those cups called *gemmae potariae.* Many of these beautiful cups are preserved in the cabinets of collectors. But few Roman artists arrived at so great a degree of perfection in carving and engraving as the Greeks. They were less skillful in design, and were for the most part content to copy from

intaglii and other sources. The demand for cameos became so great in the later days of the Empire that, in wealthy houses slaves were regularly employed in cutting cameos, just as they were in transcribing manuscripts. Of course these slaves were not all artists, not all even skillful copyists; thus the art of cameo-making became degraded.

There are few antique cameos of so small a size as to fit rings; they are mostly of bolder workmanship, in order to be effective at a distance; though Seneca mentions a ring set with the head of Tiberius in cameo. The reason why these cameo rings are rare is obvious; among the ancients, rings were little used, except as signets, for which engraved gems were, of course, only applicable.

The stones principally used by the Greeks and Romans for cameo-cutting were the agate, onyx and the Indian sardonyx; the latter was the most prized on account of the variety of tint in its different beds or layers, and its beautiful warm transparent cornelian-like ground. In these stones there are two or three, or sometimes even four layers of various contrasting hues, as white on dark red, or white on black. In others the upper layer is blue or brown, the center one white, and the base black or warm brown. The real Oriental onyx is now scarce, and therefore valuable. A stone the size of a silver dollar is worth about $150 in gold.

These precious pebbles were formerly found in India plentifully enough in the beds of torrents. The Indians were in the habit of boring holes through them and wearing them as necklaces. The Romans purchased them in their original round or oval shape, and cut them down into flat discs, to work upon according to the disposition of the strata. The cameo-cutters prized those pebbles all the more when perforated, as they considered the hole a warrant for the genuineness of the article. In the Pulski collection there is a cameo carved on an onyx that has been perforated in this manner, and in the hole is still a bit of the wire by which the stone was originally suspended.

EARLY MANUFACTURE OF PAPER IN AMERICA.

The manufacture of paper of any description was not established in any of the colonies until full fifty years after the introduction of printing, the first paper mill having been erected in the vicinity of Philadelphia by one William Rittenhousen, a native of Germany, about the year 1690. The first paper mill in New England was established in the town of Milton, near Boston, in the year 1730. In 1732, the following advertisement appeared in the weekly *Rehearsal*, of of Boston:

"Richard Fry, Stationer, Bookseller, Papermaker and Rag Merchant, from the city of London, keeps at Mr. Thomas Fleets, printer, at the Heart and Crown, in Cornhill, Boston, where said Fry is ready to accommodate all Gentlemen, Merchants and Tradesmen with setts of accompt books after the most acute manner for twenty per cent. cheaper than they have them from London. I return the Public Thanks for following the Directions of my former Advertisement for gathering rags, and hope they will continue the like Method, having received upward of Seven thousand weight already."

The early scarcity of paper in the colonies is illustrated by the following

curious advertisement, which appeared in the Boston *Evening Post*, in 1748:

"Choice Pennsylvania Tobacco is to be sold by the publisher of this paper at the Heart and Crown, where may also be had the Bulls or indulgencies of the present Pope, Urban VIII., either by the single Bull, Quire or Ream, at a much cheaper rate than they can be purchased of the French or Spanish priests."

The explanation of this was that several bales of "indulgencies," printed upon very good paper and only on one side, had been captured by an English cruiser from a Spanish vessel, and being offered at a very low price, had been purchased by the Boston printer, who saw an opportunity for profit by printing ballads or other matter for his customers upon the backs of the pontifical documents in question. It is also to be noted that about this time Robert Saltonstall was fined five shillings by the General Court of Massachusetts for presenting a petition on a small and bad piece of paper.

In 1768, Colonel Christopher Leffingwell erected at Norwich the first paper mill in the colony of Connecticut, under a promise of a bounty from the General Assembly. Two years after he was accordingly awarded twopence a quire on 4,020 quires of writing-paper, and one penny each on 10,600 quires of printing-paper. Having attained such a degree of success, it is recorded that the government patronage was soon afterward withdrawn.

In Pennsylvania, the Dunkers, who settled Lancaster county, very early gave their attention to the manufacture of paper, and also set up a printing press. During the Revolution, and just previous to the battle of Brandywine, messages were sent to their mill for a supply of paper for cartridges. The mill happening to be out of unmanufactured paper, the fraternity, who held their property in common, sent back as a substitute to the Continental army several wagon loads of an edition of Fox's *Book of Martyrs*, and from the paper supplied by the pages of this work the cartridges used in the battle were in part manufactured.

About the year 1770, the number of paper mills in the provinces of Pennsylvania, New Jersey and Delaware was reported to be forty, this department of manufacturing industry having especially developed in the vicinity of Philadelphia, which, at that time, was the centre of literary activity for the colonies. It was a business, moreover, in which Mr. Franklin was greatly interested; and he told De Warville, a French traveler who visited America in 1788, that he had himself established as many as eighteen mills.

The business of the manufacture of "paper-hangings" commenced in the colonies about the year 1760, and in 1791, it was one of the branches of domestic industry, according to the report of the Secretary of the Treasury, which were well established.

THE LANGUAGE OF JEWELS.

From the most remote period of history significance has been attached to precious stones, they being supposed to exert a baneful or blessed influence over the wearers. Among other curious old fancies about them is that which connects one with each month in the year, and with all who are born in that month. Thus, to January belong the garnet and the jacinth, which preserve the wearer from pestilence and from lightning (rather necessary at this season, in this zone). To February belongs the amethyst,

signifying temperance. It protects the wearer from evil thoughts, and cures or prevents inebriety. It makes him diligent, and procures him the favor of princes. The stone of March is the jasper, which cures hemorrhage when worn or applied to a wound. Those born in April should wear the sapphire, significant of purity. To May belongs the agate, which protects from poison and appeases pain. If single in color it renders the wearer invincible. June has the emerald, significant of hope; teaching the knowledge of secrets, bestowing eloquence and wealth. It betrays inconstancy by crumbling to pieces when it cannot avert the evil. Achmet Steiram says that "he who dreams of green gems will become renowned, and meet with truth and fidelity." The falling of an emerald from its setting is an evil omen to the wearer. When George III. was crowned a large emerald fell from the crown. America was lost to Great Britain during his reign.

To July belongs the onyx, which excites melancholy and vain terror to the wearer, but fortunately the month also possesses the cornelian, which cures these evils and also secures success, particularly in law suits. To August belongs the sardonyx, which brings riches to the wearer. To September belongs the chrysolite. To October belongs the beryl, or aquamarina, which renders the wearer successful in navigation and insures safe voyages. The opal also belongs to this month, a stone which unites the colors and qualities of all others, and has been beautifully called by a poet and artist, "a pearl with a soul in it." Its meaning is child-like, fairness and loveliness. November has the topaz, which signifies courage and cheerfulness. It shows the presence of poison by loss of color; it gives light in the dark, and dispels enchantment, if worn on the left arm or around the neck. It also strengthens intellect and brightens wit. Those whose birthday is in December have the choice between the ruby, turquoise or malachite, or can wear all three. The ruby signifies passionate love and joy, and gives pleasant dreams; but it shortens the sleep of the wearer, and disturbs the circulation of the blood, inclining to anger. The turquoise is the noblest of opaque stones, and signifies self-sacrificing love. It appeases hatred and reconciles lovers, and it relieves or prevents headaches. It also protects the wearer by drawing upon itself the evils that threaten him, becoming dark, dull, and apparently worthless, but regaining its color gradually when the danger is past. This valuable property, however, belongs to it only when given — not when bought.

A VERY LARGE HOUSE.

It is very doubtful whether in any other capital of Europe there is a house which can at all compare in size with the so-called "Freihaus," free house, in the Wieden suburb of Vienna. If you have to look for a friend when you wish to visit there, you will wander about in it just as if you were in a town. A visitor relates that he was once two hours searching for a man whom he knew lived there. This large house has thirteen court-yards — five open ones and eight covered in — and a large garden within walls. Some of the open court-yards are as large as the market places of moderate sized towns. The house itself, which covers an immense area, contains three hundred and thirty-five

dwellings of which many contain five six, seven or more rooms.

Scarcely a trade, handiwork or profession can be named which has not its representative in this enormous house. Gold and silver workers, makers of fancy articles, lodging-house keepers, book-binders, painters, agents, turners, hatters, officers, locksmiths, joiners, tutors, scientific men, government clerks, three bakers, eighteen tailors, and twenty-nine shoemakers all live in it. The house has thirty-one stair-cases, and on these alone are two hundred and thirty-five separate dwellings. It has a frontage on three streets and a square. A letter can only reach its proper address in this house when surname, Christian name, the number of the court, the number of the staircase, and the number of the apartment is written upon it. The postman has often delivered from two hundred to three hundred letters in this house. At the present time sixteen hundred persons live in this immense building, and these pay annually 82,000 florins in rent. The "Freihaus" is not only remarkable for its size, but for several other interesting circumstances connected with it. In the middle of its garden stands the "Mozart Hutte," the cottage in which Mozart composed his "Zauberflote." In the old (now no longer used) theatre of the Freihaus the same opera was performed for the first time. This theatre was situated in the center of the great court, No. 6, opposite the church — the house still possesses its own church — and was opened the 7th of October, 1786.

THE whole alphabet is in this one sentence of 48 letters: "John P. Brady gave me a black walnut box of quite a small size."

THE SEVEN ANCIENT WONDERS.

1. The brass Colossus at Rhodes, one hundred and twenty-one feet in hight, built by Chares, 258, A. D., occupying twenty years in making. It stood across the harbor at Rhodes sixty-six years, and was then thrown down by an earthquake. It was then bought by a Jew from the Saracens, who loaded nine hundred camels with the brass.

2. The Pyramids of Egypt. The largest one engaged three hundred and sixty thousand workmen, was fifty years in building, and has now stood at least three thousand years.

3. The Aqueducts of Rome, constructed by Appius Claudius, the Censor.

4. Labyrinth of Psalmetichus, on the banks of the Nile, containing within one enclosure one thousand houses and twelve royal palaces, all covered with marble and having only one entrance. The building was said to contain three thousand chambers, and a hall built of marble, adorned with statues of the gods.

5. The Pharos of Alexandria, a tower of Ptolemy Philadelphus, in the year 172, B. C. It was built as a light-house, and contained many magnificent galleries of marble — a large lantern at the top, the light of which was seen nearly a hundred miles off. Mirrors of enormous size were fixed around the galleries, reflecting everything on the sea. A common tower is now erected in the same place.

6. The Walls of Babylon, built by the order of Semiramis or Nebuchadnezzar, and finished in one year by two hundred thousand men. They were of immense thickness.

7. The Temple of Diana at Ephesus, completed in the reign of Servius, the

sixth king of Rome. It was four hundred and fifty feet long, two hundred broad, and was supported by one hundred and twenty-three marble pillars.

"HOUSEHOLD WORDS."—ORIGIN OF FAMILIAR SAYINGS.

Butler in his "Dyets's Dry Dinner," writing in 1599, says: "It is unseasonable and unwholesome in all months that have not an R in their name to eat an oyster."

The saying, "to leave no stone unturned," may be traced to a response of the Delphic oracle, given to Polycrates as the best means of finding a treasure buried by one of Xerxes' generals on the field of Platea.

"Every man the architect of his own fortune," is ascribed to Appius Claudius Cæcus, the earliest Roman writer whose name has come down to us. In 312, B. C., he began the celebrated "Appian Way from Rome to Capua"

Of the well-known saying, "Where the shoe pinches," Plutarch relates the story of a human being divorced from his wife. This person being highly blamed by his friends, who demanded "Was she not chaste? was she not fair?" holding out his shoe asked them whether it was not new and well made. "Yet," added he, "none of you can tell where it pinches me."

The saying, "When at Rome do as the Romans do," is said to have arisen in this wise: Saint Augustine was in the habit of dining upon Saturday as on Sunday; but being puzzled with the different practices then prevailing (for they had begun to fast at Rome on Saturday), he consulted St. Ambrose on the subject. Now at Milan they did not fast on Saturday, but the answer of the Milan Saint was, "When I am here I do not fast on Saturday; when at Rome I do fast on Saturday."

The *Spectator* says that Tobias Hobson was the first man in England that let out hackney horses. When a man came for a horse he was led into the stable where there was a great choice, but he obliged him to take the horse which stood next to the stable door; so that every customer was alike well served, according to his chance—from whence it became a proverb, when, what ought to be your election was forced upon you to say—"Hobson's choice."

Macaulay says that King Charles II. often remained in the Parliament while his speech was taken into consideration. The debates amused his sated mind and were sometimes, he used to say, "as good as a play."

Hume in his "History of England," ascribed to William of Orange the saying, "Die in the last ditch." When Buckingham urged the inevitable destruction which hung over the United Provinces, and asked him whether he did not see that the Commonwealth was ruined, he replied: "There is one certain means by which I can be sure never to see my country's ruin—I will die in the last ditch."

The expression "Steal my thunder," is familiar, and Disraeli accounts for it. The actors refused to perform one of John Denny's tragedies to empty houses, but they retained some excellent thunder which Denny had invented, and rolled one night when Denny was in the pit, and it was applauded. Suddenly starting up, he called to the audience: "By G—, they won't act my tragedy, but they steal my thunder."

The well known verse "Thirty days hath September," etc., is said to

have first appeared in the "Abridgement of the Chronicles of England," by Richard Gratton, 1500, under the title, "A rule to knowe how many dayes every moneth in the year hath."

"No pent up Utica contracts our powers," etc., were written by Jonathan M. Sewell, an American, about the beginning of the present century, and are to be found in an epilogue to "Cato," for the Bow Street Theater, Portsmouth, New Hampshire.

"By uniting we stand, by dividing we fall," occurs in a stirring Liberty song, written by Dickinson in 1768.

That celebrated modern political saying that "To the victors belong the spoils," was first made by William L. Marcy, of New York, in a speech in the United States Senate in January, 1832 "First in war, first in peace, and first in the hearts of his countrymen," was written by Henry Lee, in resolutions presented to the House of Representatives, on the death of Washington, 1799.

"What will Mrs. Grundy say ?" was first asked by Thomas Morton in his drama of "Speed the Plow."

"Plain as a pikestaff," and "Facts are stubborn things," are found in Smollet's translation of Gil Blas. "Peace, peace, when there is no peace," was quoted by Patrick Henry, in his celebrated speech, from the Bible — Jeremiah vi., 14. "A living dog is better than a dead lion," is also found in the Bible — Eccle. ix., 4. "In the midst of life we are in death," commonly supposed to be in the Bible, is found in the burial service in the Book of Common Prayer. "God tempers the wind to the shorn lamb," commonly supposed to be in the Bible, was written by Laurence Sterne in his "Sentimental Journey."

NICKEL—ITS USE IN COINAGE.

The people of this country have become somewhat familiarized with the name of the metal known as nickel, from its employment in the composition of our lower class of coins. Indeed, our "lame duck" cents — so called from the abortive effigy of a flying eagle, resembling a duck flying — are denominated "nickels," from the known fact that nickel forms an important part in their composition. While the intention of the government in the coining of gold and silver is to give value for value received, and thus keep the intrinsic value of coins as a bar against the use of export of the precious metals except as coin, those coins composed of pure copper, or copper with alloys, were never intended to represent, by their weight and composition merely, the value of the metals employed. Such was, however, nearly the case years ago, when a copper cent was about one-sixteenth or one-twentieth the weight of a pound of copper, when that metal was worth from 25 to 30 cents per pound; but our pure copper two-cent pieces, less than one-half the weight of an old-fashioned cent, bear now no proper relation to the market value of copper. Still, the object has been to keep our lower valued coins somewhere near the market price of the metals of which they are composed, and at the same time to prevent them from becoming inconveniently large; so nickel was introduced as a composition of cents in order to reduce their size, while preserving their value.

Nickle is a brilliant, ductile, and malleable metal, discovered by Cronstedt in 1751. It is found associated with cobalt and with iron in the ore, and is a common constituent with

meteoric iron. The usual sources of supply are the arseniurets of nickel in cobalt, and in what the Germans call *Kupfernickel*, or copper-nickel, containing fifty-six per cent. of arsenic, and forty-four per cent. of nickel. Nickel is found in Saxony, Thuringia, Hesse, Styria, Dauphine, and in Sweden. In this country its ores are found in Chatham, Connecticut, and in Lancaster, Penn., or rather about fourteen miles from the latter place; from which most of that used in the government mints is obtained. Our nickel cents contain 88 parts copper and 12 nickel.

Nickel has been used for coinage also in Bavaria. It is valuable as an ingredient of the alloy known as German silver, the best of which is made of nickel, 3 parts; zinc, $3\frac{1}{2}$ parts; and copper, 8. The Chinese *tutenag* also contains nickel, although often regarded as zinc. The *pakfong* of the East Indies is also a composition of which nickel forms a part. Nickel is more fusible than iron, and like iron is rendered still more so by combination with carbon. It is magnetic at ordinary temperatures. Owing to its freedom from oxidation in ordinary atmospheric temperatures, it has been used for the needles of compasses. It appears to have some marked points of resemblance to iron.

FIRST UNITED STATES PATENTS.

The first patent issued in the United States, of which there is any record, was granted to Samuel Hopkins, on July 31st, 1790, for making pot and pearl ashes; the second was to James Stacey Samson, on August 6th, 1790, for making candles; and the third and last for the year 1790 was to Oliver Evans, for making flour and meal.

SILK AND RIBBON WEAVING.

This extremely versatile art appears to have had its origin in China, from the recorded fact that it was there practised more than a thousand years before it was known in Europe. Poets in ancient times ascribed the art to the spider, and doubtless that poor despised insect, with all its unsightliness, may even before man's appearance on this globe, have been both spinner and weaver. Women originally spun, wove, and even performed the various operations in dyeing, and the origin of these arts is ascribed by many ancient nations to different women as woman's arts.

The Egyptians ascribed the discovery or invention of weaving to Isis; the Greeks to Minerva, the Goddess of Wisdom; and the Peruvians to the wife of Manco Copac; and in most Eastern countries the employment of weaving is still exclusively performed by women.

Nearly two thousand years ago the art of weaving must have been in an advanced state. The earliest chroniclers tell us that wrought silk was brought from Persia to Greece as early as three hundred and twenty-five years before Christ, and was known in Tiberius' time, when a law was passed in the Senate prohibiting the use of plate of massy gold, and also forbidding men to debase themselves by wearing silk, "fit only for women." Heliogabalus first wore a garment of silk A. D., 220. Silk was at first reckoned equal to gold in value, and was exchanged weight for weight, and was supposed to grow in the same manner as cotton on trees. The silk-worm was first introduced into Europe from India, in the sixth century.

Silk mantles were worn in Great

Britain by some noblemen's ladies, at a ball at Kenilworth Castle, in 1286.

The art of weaving received great encouragement from Roger, King of Sicily, at Palermo, in 1130, when the Sicilians not only bred silkworms, but also spun and wove the silk. In 1331, two weavers from Brabant settled at York, England, where they manufactured woolens, which, says King Charles, "may prove of great benefit to us and our subjects." The manufacture of woven fabrics had also spread into Italy, Spain and the south of France, a little before the reign of Francis the First, about the year 1570. Henry the 6th, in 1589, had mulberry trees introduced throughout his kingdom, purposely for the propagation of silk worms. The first pair of silk stockings brought into England from Spain were worn by King Henry VIII. and in the reign of Queen Mary a special act was passed to prevent servant maids from wearing ribbons on their bonnets. Silk was also worn by the English clergy in 1534.

The ribbon trade was first introduced in England about a century and a half ago. The manufacture was confined to a few hands for many years before it spread itself into a larger sphere.

The single-hand loom, or rather the single-shuttle loom, at first used, gradually gave way to the many-shuttle loom, or engine-loom. This description of machinery consisted for a long time only of the old-fashioned Dutch loom, a specimen of which would now be as much of a rarity as would have been a batten containing six tiers of shuttles to those old weavers of a century back.

Important improvements were made in the art from time to time, especially in figured work and the introduction of the *big* pearl, a golden harvest time in the memory of some of our oldest weavers. The advance of this class of manufacture was more prominently distinguishable between the years 1818 and 1822, when manufacturers and operatives strained every energy to excel all their former efforts, as to design as well as workmanship.

SILK MANUFACTURE OF LYONS.

France possesses within her own bounds three out of the four fibrous substances from which clothing is made—she has flax, wool and silk. The latter, which employs so many people at Lyons, is grown further south. The silk is separated from the cocoons, and is spun in other districts. The trade of Lyons consists of weaving cloth from the thread which is brought into the town. The silk grown in France is not sufficient to supply the demand, and she imports raw silk from Italy. The culture of silk receives considerable attention in France, where the government seems to act upon the idea expressed in the China laws, which point out two classes as deserving the gratitude of all—the grower of corn and the grower of silk, the former supplying food, the latter clothing. Lyons has none of the peculiarities which we usually connect with a manufacturing town. There are no tall chimneys, no dingy warehouses, no immense factories, no smoke. The looms are light, and are erected in the houses of the people. They are worked by hand. Thus you do not see at certain hours busy masses of people flowing to and from the same spot. The work goes on quietly. A good deal of it is (as the silks are narrow and the throw of the shuttle short) done by women.

The price paid for weaving plain silks is about fourteen cents per yard; for rich and flowered silks it is more. The silk manufacture of France originated in the luxury of the Court of Francis I. In addition to that grown in France, the imports of raw silk were, in 1792, 136,000 pounds. The manufacture had increased so much that the quantity imported in 1851 had increased to 2,291,500 pounds; or about seventeen fold. Lyons has on several occasions been the scene of trade outbreaks, in consequence of attempts to introduce machinery or to alter the rate of wages. The cost of carrying coal will always operate in favor of manual labor. Great Britain offers a large and increasing market. She used to import raw silk and manufacture it in England, but the importation of raw silk has decreased, and silk manufacturing has lessened. The imports of raw silk have lessened one-half, of silks from India to one-fourth, while the import of silks from Europe has increased nearly tenfold, and that of ribbons has doubled. The Lyonese silk weavers comprise about 120,000, out of a population of 300,000.

DIRECT YOUR LETTERS CAREFULLY.

The *Postal Record* says that during the year 1874 there were sent to the dead letter office nearly 3,000,000 letters. Sixty-eight thousand of these letters could not be forwarded owing to the carelessness of the writers omitting to give the county or State; 400,000 failed to be sent because the writers forgot to put on stamps, and over 3,000 letters were put in the post-office without any address whatever. In the letters above named was found over $92,000 in cash; drafts, checks, etc., to the value of $3,000,000. There were 39,089 photographs contained in the above letters. Of course nearly all the money and valuables were returned to the owners; but much needless delay, many charges of dishonesty, etc., etc., might have been saved if the writers of the letters would have been a little more careful, and taken the precaution to see that their letters were in mailable condition before depositing them in the post-office. It is more than probable that nine-tenths of all the complaints, losses and delays which are laid to the post-office department are in reality due to the carelessness of letter writers.

WHO WORE THE FIRST RING?

"Conclusive evidence is not obtainable," remarks a recent writer, "when rings were first used." But one fact is plain — they are of great antiquity, were always worn as tokens of trust, insignia of command, pledges of faith and alliance, and, equally strange, marks of servitude. The religious system of Zoroaster is exceedingly ancient, and in some of the old sculptures of that sect, images hold a ring, indicative of omnipotence and power. And to this day, the Persians, Hindoos, and all the Eastern nations, attach great significance to the ring. The Egyptians were particularly fond of this ornament. There are specimens in the Museum of the Louvre. Some of them date as far back as the reign of Moeris. At the British Museum there is an exceedingly fine specimen. This is a ring of the finest gold, of the Ptolemic or Roman period, with figures of Serapis, Isis and Horus. The same collection has also others of a similar metal, set with the scarabæus or sacred beetle. Others have the names of Thothmes III. and Rameses

III. The most ancient ring in existence is that formerly worn by Cheops, the builder of the great pyramid, found in a tomb in the vicinity of that monument, of the finest gold, with hieroglyphics. Sundry passages of Holy Writ prove the antiquity of rings. When Pharoah confided the charge of all Egypt to Joseph, he took the ring from his finger and committed it to him as a symbol of command. Ahasuerus did it in like manner to his favorite, Haman, and subsequently to Mordecai. The impression of the monarch's ring had the force of a command. "Write ye also for the Jews, as it liketh you, in the king's name, and seal it with the king's ring; for the writing which is written in the king's name and sealed with the king's ring, may no man reverse." Rings among the God-favored people, when used as seals, were called "taboath," the name of a root, signifying to imprint and also to seal. They were commonly worn on the little finger of the right hand.

TO PREVENT POLISHED MATERIALS FROM TARNISHING.

The following composition has proved efficient after several trials. Put half an ounce of solid paraffin into a glass with a wide opening, and let it melt in boiling water; then add one and a half ounce of petroleum; shake the mixture, after having corked the glass, until it becomes a cold ointment. In using, cover the metal with it, and wipe off afterwards the greater portion, so that the polish be little affected. Both matters form a carburetted hydrogen compound, which is unaffected by moisture and the oxygen in the air. A thin coat is sufficient to prevent polished metals from tarnishing.

INLAID PEARL.

Cast and sheet-iron and papier mache are the materials upon which pearl is generally inlaid. The process is as follows:—If the article be of cast-iron, it is well cleaned from the sand which usually adheres to the casting, and is blackened with a coat of varnish and lamp-black. When this is thoroughly dried, a coat of japan or black varnish is spread evenly upon it. Before the varnish becomes too dry, pieces of pearl cut in the form of leaves, roses, or such flowers as the fancy of the artist may dictate, or the character of the article may require, are laid upon the varnish, and pressed down with the finger, and they immediately adhere to the varnished surface. The work is then placed in a heated oven and kept there several hours, or until the varnish is perfectly dried. It is then taken from the oven and another coat of varnish applied indiscriminately on the surface of the pearl and the previous coating, and again placed in the oven till dry. This process is repeated several times. The varnish is then scraped off the pearl with a knife, and the surface of the pearl and the varnish around it is found to be quite even. The pearl is then polished with a piece of pumice stone and water, and the surface of the varnish is rubbed smooth with powdered pumice stone, moistened with water. It is in this unfinished state that the pearl has the appearance of being inlaid, and from which it derives its name. Its final beauty and finish depend altogether on the skill of the artist who now receives it. Under his hands the shapeless and almost unmeaning pieces of pearl are made to assume the form of beautiful flowers, leaves, etc. The artist traces the stems and leaves of

the flowers with a camel's-hair pencil, dipped in a size made of varnish and turpentine. Upon this he lays gold leaf, which adheres where there is size, and the superfluous gold is carefully brushed off with a piece of silk. The flowers and leaves are then painted in colors, and when dry the picture and surface of the article is covered with a coat of refined white varnish.

SPONGE.

The best sponges for toilet use come from the Ægean and are found in about eight fathoms of water. They are gathered by a brotherhood of divers, who inhabit the islands off the Carian coast, and those between Rhodes and Calymnos. A coarse quality of sponge is found on the coast of Florida and the West Indies. These are gathered by longshafted forks. To remove the sarcode, the sponge is burried for some days in the sand until the animal matter rots, and then the horny keratose is soaked and washed. Many varieties of sponge are found in warm seas, but that of commerce is almost exclusively derived from the Grecian Archipelago, Lyria, Barbary, and the West Indies. The Lyrian or Turkish, also known as toilet sponge is most esteemed. Next in value and closely resembling it is that fram the Grecian Archipelago. Coarser varieties valuable on account of their firmness and tenacity come from Greece and Barbary. That from the West Indies is harsher, coarser, and less durable than the Mediterranean kinds. In sponge-fishing, three methods—spearing, diving and dredging are employed. The Greeks, who are the most skillful and successful sponge-fishers, employ small boats, carrying a rower and spearman, the latter of whom views the bottom through a tin tube, furnished with a sheet of glass at the lower end, which is held beneath the surface of the water. He manages to transfix sponges at a depth of sixty feet by using three or four spears, thrown with such quickness and accuracy that the end of the first is struck by the second, before it disappears beneath the surface, imparting an additional impetus and enabling it to reach the sponge. The knack of using three or four spears has not been acquired by the Arabs or Sicillians.

SPOONS.

Ancient Egyptian spoons were made shell-shaped of glass, stone, marble, wood, shell, and ivory, and many of them handsomely carved. A number are in the Abbott Collection New York brought from a tomb at Abouseer (1430, B. C.) Sakkarah, and elsewhere. From the collections of Wilkinson, Burton, and Salt, they are of bronze, wood, and requently gilt. Some of the handles were hinged, others have sliding collars. The Greeks used spoons at meals. The cochlear had a pointed end for picking snails out of the shells and a flatter end for eating eggs.

HOW GUNPOWDER IS MADE.

How do you think you would like to live fearing every moment to be blown up; none daring to speak aloud, to jar anything, for fear of starting an explosion that would send you in an instant to the other world?

You don't think it would be very pleasant? Well, it isn't; yet hundreds of men live in just that state—work, receive pay, and live, year after year, in the very sight of death, as it were—all that the world may have gunpowder. You can easily guess

that these men go about quietly, and never laugh.

You know that gunpowder is very dangerous in a gun or near a fire ; but perhaps you don't know that it is equally dangerous all through the process of making. A powder mill is a fearful place to visit, and strangers are very seldom allowed to go into one. They are built far from any town, in the woods, and each branch of the work is done in a separate building. These houses are quite a distance from each other, so that if one blows up it won't blow up the rest. The lower parts of the building are made very strong, while the roofs are very lightly set on, so that if it explodes only the roof will suffer. But, in spite of every care, sometimes a whole settlement of the powder-mills will go off almost in an instant, and every vestige of the toil of years will be swept away in a second.

But, though you feel like holding your breath to look at it, it is really a very interesting process to see. Powder is made, perhaps you know, of charcoal, saltpetre and brimstone. Each of these articles is prepared in a house by itself, but the house where they are mixed is the first terrible one. In this building is an immense millstone, rolling round and round in an iron bed, and under the stone are put the three fearful ingredients of gunpowder. There they are thoroughly mixed and ground together. This is a very dangerous operation, because if the stone comes in contact with its iron bed it is very apt to strike fire, and the merest suspicion of a spark would set off the whole. The materials are spread three or four inches in the bed; the wheel, which goes by water power, is started, and every man leaves the place. The door is shut, and the machinery is left to do its terrible work alone. When it has run long enough, the mill is stopped, and the men come back. This operation leaves the powder in hard lumps or cakes.

The next house is where the cakes are broken into grains, and, of course, is quite as dangerous as the last one. But the men can't go away from this, they are obliged to attend to it every moment; and you may be sure not a laugh or a joke is ever heard within its walls.

Every one who goes in has to take off his boots and put on rubbers, because one grain of the dangerous powder, crushed by the boot, would explode the whole in an instant.

The floor of this house is covered with leather, and is made perfectly black by the dust of the gunpowder. It contains a set of seives, each one smaller than the last, through which the powder is sifted; and an immense ground and laboring mill, where it is ground up, while men shovel it in wooden shovels. The machinery makes a great deal of noise, but the men are silent, as in the other houses. The reckless crashing of the machinery even seems to give greater horror, and one is very glad to get out of that house.

The stoving-room is next on the list, and there the gunpowder is heated on wooden trays. It is very hot, and no workmen stay there. From there it goes to the packing-house, where it is put in barrels, kegs and canisters.

Lastly, through all these houses, it goes at last to the store-house. One feels like drawing a long breath to see the fearful stuff packed away out of the hands of men, in this curious house.

You've heard of things being as dry as a powder house, but you would not

think this very dry. It is almost imbedded in water. Did you ever hear of a water roof before? Instead of steps to go in, there are shallow tanks of water, through which every one must walk to the door.

In none of these powder houses is any light ever allowed except sunlight. The wages are good, the day's work is short, ending at three or four o'clock. But the men have a serious look, that makes one think every moment of the danger, and glad to get away.

STAIN FOR THE SAP OF BLACK WALNUT.

Take 1 gallon of strong vinegar, 1 pound dry burnt umber, ½ pound fine rose pink, ½ pound dry burnt Van-dyke brown. Put them into a jug and mix them well; let the mixture stand one day and it will then be ready for use. Apply this stain to the sap with a piece of fine sponge; it will dry in half an hour. The whole piece is then ready for the filling process. When the work is completed, the stain part cannot be detected even by those who have performed the job. This receipt is of value, as by it wood of poor quality and mostly of sap can be used with good effect.

WESTERN RIVERS.

The Mississippi river is 2,616 miles in length, and is 1,680 feet above the level of the Gulf at its utmost source. At St. Paul it is 660 feet above the Gulf level; at the head of Rock Island rapids, 505 feet; at Saint Louis, 407 feet; at Cairo, 322; at Memphis, 221 feet; at Natches, 66 feet; at New Orleans, 15 feet; and at the head of the of the Passes, 2 feet 9 inches. Arkansas river rises 1,514 miles from its entrance into the Mississippi, and 10,000 feet above the Gulf level; at Fort Smith it is 418 feet above the Gulf; at Little Rock, 252 feet, and at its mouth, 162 feet. The Missouri river rises 2,908 miles above its entrance into the Mississippi, and 6,800 feet above the Gulf level; at Fort Benton it is 2,815 above the Gulf; at Sioux City, 1,065 feet, and at St. Joseph, 756 feet. The Ohio is 609 feet above the Gulf at Pittsburgh, and 532 at Cincinnati.

THE OLDEST TIMBER.

Probably the oldest timber in the world which has been subjected to the use of man is that which has been found in the ancient temples of Egypt. It is found in connection with stone work which is known to be at least 4,000 years old. This wood, and the only wood used in the construction of the temple, is in the form of ties, holding the end of one stone to another in its upper surface. When two blocks were laid in place, then it appears that an excavation about an inch deep was made in each block, into which an hour-glass shaped tie was driven. It is, therefore, very difficult to force any stone from its position. The ties appear to have been tamarisk or shittim wood, of which the ark was constructed, a sacred tree in ancient Egypt, and now very rarely found in the valley of the Nile. Those dovetailed ties are just as sound now as on the day of their insertion. Although fuel is extremely scarce in that country, these bits of wood are not large enough to make it an object with the Arabs to heave off layer after layer of heavy stone for so small a prize. Had they been of bronze, half the old temples would have been destroyed years ago, so precious would they have been for various purposes.

REMOVING A TIGHT FINGER RING.

It is seldom necessary to file off a ring which is too tight to readily pass the joint of the finger. If the finger is swollen, apply cold water to reduce the inflammation, then wrap a small rag, wet in hot water, around the ring to expand the metal, and soap the finger. A needle threaded with strong silk can then be passed between the ring and finger, and a person holding the two ends and pulling the silk while slowly sliding it around the periphery of the ring may readily remove the ring. If the ring is a plain hoop this process is easy; if it has a setting or protuberance more care will be required. Another method is to pass a piece of sewing silk under the ring and wind the thread, in pretty close spirals and snugly, around the finger to the end. Then take the lower end —that below the ring—and begin unwinding. The ring is certain to be removed unless the silk is very weak. The winding compresses the finger and renders the operation less difficult.

AN OLD ENGLISH PATENT.

It is said that the following is the first patent ever granted in England, for the preservation of food: "A. D. 1691, Oct. 7, No. 278. Porter Thomas and White John.—A grant unto them of the sole use, exercise and benefit of their new invencon of keeping and preserving by liquors *or otherwise* all sorts of flesh, fowle and fish, and many other things, either in pieces or in whole bodyes, at a cheaper rate, for many years in all clymates, without changing the nature, quality, taste, smell or color thereof, as good, palatable and wholesome, to be eaten and made use of for any intent and purpose whatsoever, as when first killed or put into such liquor; to hold and enjoy the same for 14 years, according to the statute." Can any modern patent beat this?

MODES OF SALUTATION.

In the East the people are pastoral, unwarlike, fond of quiet, and are also encircled by religious ideas. We see this in the simple meeting of persons in the street. They convey—in the form of prayer—an earnest wish that the other may enjoy peace. Throughout the Bible this blessing forms the staple of salutation. Salem or Shalum means peace, and is doubtless the meaning in the word Jerusalem. The Bedouins of our time have the same idea embodied in their salutations. The Arab meets his friend thus: "May God grant you a happy morning;" "May God grant you his favors;" "If God wills it, you are well."

The difference here is very considerable, according to the rank of the person saluted. The most common mode is merely laying the right hand on the bosom, and inclining the body a little; but when to a person of great rank, they bow almost to the ground, and kiss the hem of his garment. Inferiors, out of deference and respect, kiss the feet, the knees, or the garments of their superiors.

The dominant trait in the character of the Ottoman is known to be great pride, much gravity, and apparently a considerable distaste to the use of his tongue in speech. It will be noticed in many of his sayings that those three are often unfolded. "May your shadow never be less," shows how they value flesh.

In Egypt the climate is so very warm and feverish, and perspiration is so

very necessary to health, that an Egyptian greeting is, "How do you perspire?" According to Herodotus, the Egyptians saluted by letting the hand fall to the knee, unlike any other nation.

The Laplanders apply their nose strongly against that of the person they salute. Dampire says that at New Guinea they are satisfied to put on their heads the leaves of trees, which have ever passed for symbols of friendship and peace.

The Spaniard wishes you "Good morning," "God be with you, Senor."

The Neapolitan devoutly says, "Grow in sanctity."

The Piedmontese, "I am your servant."

The Genoese of modern times says, "Health and wealth."

The Romans, who were robust had energetic salutations, expressing force: "*Salve;*" "Be strong;" "Be healthy;" "*Quid agis;*" "What do you do?" or "What make you?"

The Chinaman, with earnest solicitude, asks, "Is your stomach in good order?" "Have you eaten?"

The German says, "Wie gehts?" "How goes it?" To bid adieu, he says, "Leben sie wohl!"—"May you live well."

The Pole embraces the knees and and shoulder, and in departure says, "Be ever well."

"In Hungary they say at departure, "May you remain well;" "God keep you well."

In Servia they say: "How are acorns?" Or, "Are acorns plenty?" They being a pastoral people.

In Turkey, great attention is paid to salutation; the arms are laid over other, each on his own breast, and each bending the head.

In Sweden, besides the universal "Gud day," which needs no translation, they ask, "Hura mar Ni?" Literally, "How can you?" meaning, "Are you strong and vigorous?" Also, "God sei tava!" "God be praised!" Their parting is, "Far val."

The Moors of Morocco ride at full speed toward a stranger, as if to run him down; as soon as they have approached near, they stop suddenly and fire a pistol over his head.

The manner of saluting the great Mogul is to touch, with the hand, first the earth, then the breast, and then lift it above, which is repeated three times in succession, as you approach him.

The Hindoos bend the head to the earth.

ORIGIN OF IRON BRIDGES.

The London *Quarterly,* in alluding to the varied applications of iron, gives Thomas Paine the credit of being the inventor of iron bridges. It states that when he resided in Philadelphia, in 1787, he proposed to erect a bridge over the Schuylkill river, and that it should be of great span, without piers (so as not to be obstructed with ice). Paine boldly offered to build an iron bridge with a single arch of 400 feet span. In the same year, he went to Europe and sent a copy of his plan to Sir Joshua Banks, in London, who submitted it to the Royal Society. Paine then went to the Rotherham Iron Works, in Yorkshire, to have the design of his bridge carried out. Segments of an arch of 410 feet span were made of cast and wrought iron. The castings were then shipped off to London and erected on a bowling-green, at Paddington. It was there visited by a large number of persons and regarded as a great success. Paine, being poor, became debtor

for the castings, but his creditors at last agreed to take back the castings, and they used them on a bridge erected over the river Wear, at Sunderland, where it was erected in 1794. This bridge was long regarded as the greatest triumph of art. Its span exceeded that of any then existing stone arch, being 236 feet, with a rise of thirty-four feet, the springing commencing ninety-five feet above the bed of the river, allowing vessels of 300 tons burden to sail underneath without striking their masts. "If," says Mr. Stephenson, "we are to consider Paine as its author, his daring in engineering certainly does full justice to the fervor of his political career; for, successful as the result has undoubtedly proved, want of experience and consequent ignorance of the risk could alone have induced so bold an experiment; and we are rather led to wonder at than to admire a structure which, as regards its proportions and the small quantity of material employed in its construction, will probably remain unrivaled."

MUSTARD.

Mustard seed was used medicinally by the Greeks, and held by them in such estimation that the discovery of its medicinal value was attributed to Æsculapius. It would be difficult to determine satisfactorily when it was first used as a condiment in this country, but it seems probable that its employment dates from about the time of the Saxons. It does not appear generally to have been ground up, as it is at the present time, but was usually eaten whole, a practice that at least protected the consumer from adulteration. Girarde says:—"The seede of mustard, pounded with vinegar, is an exellent sauce, good to be eaten with any grosse meates, either fish or flesh, because it doth help digestion, warmeth the stomacke and provoketh appetite." At the present time vinegar and spices enter into the composition of the French mustard, and contribute to its keeping qualities. Mustard is not a fancy condiment; it has distinct hygienic value. A French writer thus speaks of it:

"Of all the condiments used at table for giving flavor to meat, for stimulating the appetite, and disguising the faults of cooks, mustard is without doubt that which occupies the first rank, not only from its antiquity, which dates back to the time of the Hebrews, but also from its beneficial qualities. According to medical authority this condiment, the dietetic use of which is so general, greatly assists the organs of digestion. It augments, by the slight irritation it causes, the strength and elasticity of the fibres, it excites in the stomach and intestines the digestive juices, and promotes the passage of the residues of food by accelerating the peristaltic movement.

"Mustard agrees, therefore, with indolent, lymphatic, and weak stomachs. It is wholesome to those whose stomachs and intestines are torpid, and hence it is especially useful to aged persons."

Previous to the year 1720, mustard was prepared for use by pounding the seeds in a mortar, and roughly separating the integuments; but it is said to have occurred to a woman named Clements, of Durham, to grind the seed, and then dress the flour. The mustard so prepared was superior to any other, received royal patronage, and enjoyed an extensive sale; the process was kept a secret and a fortune realized. Hence, Durham mustard became celebrated, and the name was

long retained by makers to indicate mustard of a superior quality. Thus far efforts were directed to the manufacture of a pure mustard; but all this has long since undergone a great change, and now, looking over a manufacturer's list of qualities, we see a great variety, from a mustard flavored with flour to a flour flavored with mustard.

After discussing the value and reasons given for the mixture of mustard with common flour, a practice he finds no excuse for, the writer quoted continues: — "In a former paper I have shown that the flour of the black seed is the essential constituent of mustard, and to the production of its volatile oil the pungency is due; that white mustard yields the milder flour; and also the theory of its addition to the black in definite proportions. I have likewise alluded to the process for detecting by the microscope the presence of flour and tumeric in commercial samples; but this is not all that a thorough examination of mustard, even when pure and free from flour, involves; care must be taken to determine the relative quantity of black and white, as the latter in too great a quantity is also a diluent, though not an adulterant.

In mustard the distinction should always be borne in mind between genuineness and quality. A genuine mustard may be made of any quality and to suit any price, dependent mainly on the relative proportions of white flour to the black. The large white seed costs less as seed and gives more flour than the black; and on reference to trade circulars it will be seen that genuine mustards range from 9d. to 1s. 6d. per lb. In some cases the mustard sold at a low price as genuine is composed of the white flour alone.

HISTORY OF BEARDS.

Interwoven, tangled we may say, with almost everything we examine, whether of ancient or modern times, we find the great beard question.

To go to the root of the matter, we must in point of fact, go to the root of the beard: The anatomist informs us that the hair is a horny substance, a hollow, cylindrical, slightly tapering body, with tubular roots growing from vascular pulps, pulp and roots enclosed in bulb-shaped capsules implanted in the substance of the true skin; externally, these bulbs are tough and fibrous. Next comes a spongy cellular mass, into the cells of which the nourishing vessels pour their blood. Bichat has described an inter-cellular communication in hair, similar to that of the ascending sap in vegetables.

The importance of the question, "to wear or not to wear," can perhaps be shown in no better way than by the statement of the fact, that a man of 50 years will on an average have cut off eight feet of beard and thirteen feet of scalp-hair. Cutting and shaving the beard have on this account been deprecated by many physiologists, as tending to weaken the strength by the general drain of blood; to diminish the intellect by diverting blood from the brain; and to diminish the reproductive power by an unknown sympathy.

It might be, and is urged in answer to this, that many, nay, most, great military commanders — Alexander, Napoleon, Wellington, Washington — and poets — Dante, Milton, Goethe Coleridge, Schiller, Byron, Scott, Tennyson, etc., and statesmen, as Franklin, Webster, Pitt and Tallyrand; men of science, theologians, philosphers, sculptors, musicians, painters, popes, and

reformers innumerable, have been beardless men. But not to mention the illustrious wearers of the beard—Surenne, Raleigh, Drake, Clarendon, Pericles, Bacon, Demosthenes, Cromwell, and Johnson, Shakespeare, Rubens, Galileo, Michael Angelo, Da Vinci, with Keppler, Calvin, Solinski, Liebnitz, Sir Matthew Hale, and a host of the hirsute—there is a strong argument for retaining the beard in the consideration of the annual expenditure which is incurred by the nation by this practice of shaving.

Nations having little or no beard, generally pluck out or shave off the straggling hairs from the face. We are familiar with the beardless face of the American Indians. It has been a custom with them for long ages to remove all signs of beard.

The Chinese form a remarkable exception to this rule; though by nature destitute, or nearly so, of hair on their faces, they regard the possession of this appendage as desirable, and carefully cultivate the scanty crop which they do possess, not suffering the razor to glide over their chins.

The Greeks wore beards from the earliest times. All the great heroes and philosophers of Athens and Sparta were bearded.

Among the Romans shaving was unknown till the year of the City 474, or 300, B. C., when the first barbers were brought to Rome from Sicily; but it was long before the practice became general. It grew into favor gradually, and at the time of Hadrian, 117, A. D., was universal. This Emperor, however, wore a beard to conceal the scars on his face; and fashion, usually so imperious, yielded to the will of one stronger than herself. Chins became suddenly invisible.

Great attention was paid by the Romans to the beard, as among women to the hair of the head; while the latter spent hour after hour in the careful binding up of towers of hair, and the men were no less earnestly employed in combing, curling, and annointing their beards. Seneca complains that the Roman youth ran to excess in the attention which they paid to dressing their beards.

It was the custom to present the first growth of the beard to some god, usually to the Lares. On the occasion of the consecration of a young man's beard, his friends made entertainments for him; it was a regular festival day; all business was laid aside, he received presents, and made and expected visits of ceremony.

The Turks esteem the beard the most noble ornament of man, they consider it more infamous for any one to have his beard cut off, than among us to be publicly whipped, pilloried, or branded with hot iron; there are not a few in that country who would prefer death to this kind of punishment. To pull, or irreverently handle the beard is a deadly insult. Turkish wives kiss their husbands' beards, and children, their fathers', as often as they come to salute them.

In Germany the custom of wearing beards was never altered; such beards as were worn by their ancestors, who came with the Aser from Asia with Odin, are worn now by the Germans.

The Crusades took from Europe some of her best beards: Geoffry surnamed *the bearded*, and Baldwin IV., called "handsome beard," were the most remarkable. "William Fitzosbert, or Longbeard, the great demagogue of that day, reintroduced among the people who claimed to be of Saxon origin, the custom of wearing long beards. He did this to make them as

much as possible unlike the Normans. He wore his own beard hanging down to his waist, from whence the name by which he is best known to posterity."

A painter named John Mayo lived at the court of Charles V. of Germany; he was a very tall man; his beard, which he confined in a girdle to his waist, reached to his feet and swept the ground, when he loosened it. In France the beard was worn during the reign of Henry of Navarre; but his successor, Louis XIII., was a young boy; immediately the luxuriant beards of the preceding reign dropped away to a small tuft under the lower lip. Sully, the prime minister of Henry IV. kept his long beard, and was ridiculed for so doing by some of the young; turning to the king, he said: "Sir, when your father, of glorious memory, did me the honor to consult me on his great and important affairs, the first thing he did was to send away all the buffoons and stage dancers of his court."

The Germans have a legend of Frederic Barbarossa, that he is not dead, but in an enchanted sleep, sitting with his knights at a marble table in the cavern of Kyffhausen, in the Hartz mountains. His long red beard has grown during his enchantment, and covering the table descends to the floor; and he sits thus waiting the moment that shall set him free. There he has been kept long centuries — there he must stay for ages.

The Egyptians wore false beards, to distinguish them from women, though they shaved their faces clean. These were made of plaited hair, and had a peculiar form, according to the rank of the person by whom they were worn.

The declaration of St. Paul that "long hair is a shame unto a man" has been made the pretext for many enactments of civil and ecclesiastical governments. As we have seen, the Gauls and Franks forbade *slaves* and *merchants* to wear the beard; and William the Conqueror rendered himself odious in the eyes of the Saxons by ordering them to shave. In 1535 Henry VIII. commanded all about his court to poll their heads, and to give example, he caused his own head to be polled, and from thenceforth his beard to be knotted and no more shaven. The Tartars waged a long and bloody war with the Persians, declaring them infidels because they would not cut their whiskers according to the fashion of Tartary. Much of the religion of the ancients lay in the management of their beards.

Bearded women have existed at all periods. Herodotus has given us a fabulous account of the nation of Pedasnes above Halicarnassus, among whom the chin of the Priestess of Minerva regularly budded with a large beard whenever any great public calamity impended (Her. I., 75). A woman of Copenhagen, Bartel Garetji, had a beard reaching to her waist. Charles XII. of Sweden had a *female grenadier* in his army who possessed the beard no less than the courage of a man. Margaret, Duchess of Austria, and Governess of the Netherlands, had a large, wiry, stiff beard, on which she greatly prided herself. The recollection of the bearded woman of Barnum's Museum is doubtless yet green in the memory of our readers. In the nursery of Albert, Duke of Bavaria, there is reported to have been a virgin with a very large black beard. Such instances are, however, very uncommon.

Says Shakespeare: "He that hath a *beard* is more than a youth; and he

that hath *no* beard is less than a man." The practice of clean shaving has been gradually adopted by civilized nations, and is now the prevailing custom; but it is troublesome, expensive and detracts from the manliness of a countenance.

HISTORY OF CHRISTMAS.

In European countries, Christmas has, for centuries, been one of the most noted of Christian "holy days." By the command of Pope Telesphorus it is said to have been first observed, and as one of the moveable feasts, it was celebrated by some churches during the months of April and May. The present date for its observance was not fixed until the fourth century, when the theologians and scholars of the Romish Church decided upon the 25th of December as the birthday of our Savior. The decision was based upon tradition and not upon well-authenticated history; but it has been usually accepted as correct, and recognized as such by the church.

In Roman Catholic countries and among the adherents of the Greek church, the day is ushered in with great rejoicings. Dancing, religious dramas, Christmas feasts and carols make it a cheerful festival. But in Germany it is the chief of holidays. There it is known as the "Children's Festival," and the entire day is devoted to the young. German parents first introduced the Christmas tree, with its gifts, and nowhere is this pleasant custom more thoroughly appreciated than among the people of that nation. A German Christmas tree, with its lighted tapers and heavily laden branches, is the token of merry makings and delightful family rejoicings.

In England, Christmas has always been observed not only as a religious but also as a domestic festival. In palace and in cot, in city and in hamlet, from the Chevoit Hills to the Isle of Man, the whole kingdom rings with Christmas cheer. Many of the old customs, however, have been abandoned. The Christmas scenes described by Irving are now rarely witnessed. Then the holiday season commenced with Christmas Eve and continued until Twelfth Night. Each mansion was decked with wreaths of holly, or with ivy and hawthorne branches; and relatives, the tenantry and the stranger who claimed hospitality were entertained. The mistletoe was hung in the hall amid shouts of great rejoicing; the table overflowed with tempting food, conspicuous among which was the Christmas dish of the Boar's head.

Around the hearth at night-fall when the huge yule log was lighted and the Wassail bowl filled to the brim, the guests gathered for the evening's sports. With song and jests, games of snap dragon and apple-bob, weird stories and superstitions, legends of by-gone days and the merry dance, the hours flew swiftly by. These festivities often continued for several nights, but usually concluded with Twelfth Night.

Since the settlement of this country, in the Middle, and especially the Southern States, Christmas has been a day of merry-making. Our Puritan fore-fathers did not look with much favor upon the institutions of the "old country," especially those that they thought were of Papal origin or had Romish tendencies.

They were, therefore, from the first, stern opponents of Christmas festivities. But this rigidity has gradually passed away, and New England now

follows the example of her sister States in the recognition of the day.

But while it is pleasant to think that the day is remembered with joy and gladness, and that for many centuries it has proved the queen festival of the year, it is more pleasing still to recall its origin, and to go back in fancy to the Christmas scene on the plains of Bethlehem; to the shepherds watching their flocks by night, to the song of the angels, and the star that guided the Magi to the cradle of Him from whom all the blessings of Christianity come. This association should be the source of our joy, making us sing in our hearts as with our lips, "Glory to God in the highest, and on earth peace and good will to men."

THE CHRISTMAS TREE.

This is doubtless of German origin. Though in its present form it is comparatively of recent date, yet its pagan prototype enjoyed a very high antiquity. The early Germans conceived of the world as a great tree whose roots were hidden deep under the earth, but whose top, flourishing in the midst of Walhalla, the old German paradise, nourished the she-goat upon whose milk fallen heroes restored themselves. Yggdnafil was the name of this tree, and its memory was still green long after Christianity had been introduced into Germany, when much of its symbolic character was transferred to the Christmas tree. At first fitted up during the Twelve Nights in honor of Berchta, the goddess of spring, it was subsequently transferred to the birthday of Christ, who, as the God-man, is become the "resurrection and the life." The evergreen fir-tree, an emblem of spring-time, became the symbol of an eternal spring. The burning lights were to adumbrate Him who is the "light of the world," and the gifts to remind us that God, in giving His only Son for the world's redemption, conferred upon us the most priceless of all gifts. This symbolism extended also to the most usual of Christmas presents, apples and nuts; the former being considered as an emblem of youth, the latter a profound symbol of spring, while the "boy's legs" relate to Saturn, who devoured his own children, and the *kropfel* to the thunder-stone of Thor.

HISTORY OF LEATHER.

Leather consists essentially of the skins of animals chemically altered by the vegetable principle called tannin or tanic acid, so as to arrest that proneness to decomposition which is characteristic of soft animal substances. Its invention reaches beyond the dawn of history, and was probably among the earliest germs of civilization, for as the skins of animals would naturally be among the first articles of clothing, any means of preserving them more effectually than by drying would be highly prized. The discovery that bark had this effect was doubtless the result of accident. The principle of its action was unknown up to the present century, and the same unvarying method had been employed from the earliest times until the last few years, when the invention of new processes has much facilitated the manufacture.

The skins of all animals used in the production of leather consist chiefly of gelatine, a substance which easily enters into chemical combination with the tannic acid found in most kinds of trees, and forms what may be

termed an insolvable *tanno-gelatin.* This is the whole theory of tanning or converting the skins of animals into leather. Formerly oak bark was supposed to be the only tanning material of any value, but lately very numerous additions have been made to this branch of economic botany. In addition to the process of tanning in making leather, there are other modes, one of which is tarring, another *dressing in oil.* The term *pelt* is applied to all skins before they are converted into leather. When simply made into leather in the state we find in shoe-soles, it is called rough leather; but if, in addition, it is submitted to the process called currying, it is termed dressed leather. The skins which form the staple of our leather manufacture are the ox, cow, calf and kip, buffalo, horse, sheep, lamb, goat, kid, deer, dog, seal and hog. Besides the ox and cow hides furnished by the home-trade, vast numbers are imported from Monte-Video, South America, Russia and Northern Germany, and a very considerable number of dry buffalo hides are brought from the East Indies.

HOW RUSSIA LEATHER IS MADE.

The inimitable products of ripened manufactures in ancient seats can only be attained by other communities by first closely studying the principles and modes of operation, and then patiently practicing the art until the manual "mystery," which is in all refined manufactures the greatest part, is mastered by the skill of generations of workmen. This is a difficult and not sudden success; but it is at once one of the most honorable and durable kind. Some nations have more genius and disposition than others for patient excelling. Perhaps if the accomplishments of each nation could be closely examined with reference to the qualities as well as the circumstances that favor them, a clear family likeness might be traced between the parental character and its material offspring. What the Russians possess in their nature specially adapting them to the production of Russia leather and sheet iron, we shall not pause to inquire; although the tanners of all Europe have done their best in vain to emulate the former product; but the communicable part of the process they pursue is stated as follows by one who has been there to investigate it.

The best material for the red leather is goat skin, on account of its softness and smoothness; but the largest beef hides and ram's skins are also worked. The skins are first put into running water for one week, during which time they are taken out daily and thoroughly beaten with a wooden brake, a work of skill and patience, which breaks up the "nerve" and softens the fibre to a pulpy condition. Next, they spend a month in a lye made of lime or ashes, of which the exact quality, as we have no chemical description, must be left to judgment and experiment. The hair is then removed, and the alkaline properties are got rid of by soaking the skins in an infusion of white gentian in fresh water for twenty-four hours. The swelling of the skins is now a matter of particular care, for which they are soaked four or five days in a mixture of oat meal and water. They are now ready for the tannin, which is extracted from the bark of the willow. (What special virtue there may be in the Russian vegetable products employed may possibly be worth an easy inquiry.)

In the first solution, the skins remain but three days, and are again

beaten with the brake. The second solution, which is stronger than the first, retains them eight or ten days. They are then dried with the flesh side upward; again beaten, then greased, dyed and finished; using log-wood and alum for red, and alum and green vitriol for the dark color. The mode of dying is peculiar. A number of skins are sewed up into the form of a sack, closed all around except a small opening at one end to admit the dyeing liquid. They are kept in motion in the dye until it has reached all parts, and then hung up to drain. The exclusion of light and air and slow draining in close contact may have some importance in practice. The skins are then dried, and again dyed with a sponge. The whole process is repeated two or three times. They are next greased again on the flesh, and grained with a notched stick passing through the length and breadth of the skin until small furrows are gradually produced. After graining they are greased again, with birch or linseed oil, and put on the wooden horse to be smoothed. The birch oil contributes evidently to the undefinable characteristic odor by which Russia leather is distinguished.

PATENT LEATHER.

The "patent leather," so-called, used in manufacturing fine boots and shoes, for the skirting of saddles, for carriage tops and dash-boards, for fancy styles of harness, and many other uses, is made by methods quite distinct from ordinary tanning; and it embraces some twenty-five or thirty different varieties, including those colored red, blue, amber, bronze, and many other colors.

The hides are generally tanned with hemlock, and require high liming and weak sour liquor to secure a soft grain, and are but lightly stuffed. They are then run through splitting machines to bring them to the desired thickness. Some of the heavier hides are passed through the machines as much as five or six times. The inner and outer—that is, the grain and flesh side splits—are commonly sold to the trunk-makers, and bring from twenty-five to upward of thirty cents per pound.

The great essential in making superior patent leather consists in properly applying the polishing substance, technically termed "sweetmeat," and which is composed for the most part of linseed oil. The hides, previously well dried, and softened by beating with pine blocks and what is known as "boarding," are stretched on frames provided for the purpose. The "sweetmeat" is applied in successive coats, which are fixed by exposure to a high temperature, alternating with several applications of the material. In order to secure this, the frames are slid into properly constructed ovens, heated by steam pipes to 60 or 70 degrees, and are left there until the "sweetmeat" or varnish is set. Any roughness that may be found at any stage of the process is polished off with the pumice stone, the dust being very carefully removed by means of a wet brush, followed by a dry one. The entire operation occupies from one to three weeks. That variety known as enameled leather requires additional manipulation, being passed through a graining machine, in which a heavy brass roller with a slightly corrugated face is pressed forcibly upon the leather to perform a portion of the work of finishing the article, the balance being done by a peculiar system of "boarding" by hand.—*American Artisan.*

RAILWAY SIGNAL CODE OF THE UNITED STATES.

One whistle signifies "down breaks."
Two whistles signify "off breaks."
Three whistles signify "back up."
Continued whistles signify "danger.'
Rapid and short whistles, a "cattle alarm."

A sweeping parting of the hands on a level of the eyes signifies "go ahead."

Downward motion of the hands with extended arms signifies "stop."

Beckoning motion of one hand signifies "back."

Red flag waved upon the track signifies "danger."

Red flag by the roadside signifies "danger ahead."

A red flag carried upon a locomotive signifies "an engine following."

Red flag hoisted at a station is a signal to "stop."

Lantern at night raised and lowered vertically is a signal to "start."

Lantern swung at right angles across the track means "stop."

Lantern swung in a circles signifies "back the train."

DIPPING THE HAND INTO MOLTEN IRON.

The thing has been done over and over again, observed Dr. Carpenter in a recent lecture — that a man has gone and held his naked hand in such a stream of molten iron, and has done it without the least injury; all that is required being to have his hand moist, and if his hand is dry, he has merely to dip it in water, and he may hold his hand for a certain time in that stream of molten iron without receiving any injury whatever. This was exhibited publicly at a meeting of the British Association at Ipswich, many years ago. It is one of the miracles of science, so to speak; they are perfectly credible to scientific men, because they know the principle upon which it happens, and that principle is familiar to you all, that if you throw a drop of water upon hot iron, the water retains its spherical form, and does not spread upon it and wet it. Vapor is brought to that condition by intense heat, that it forms a sort of a film, or atmosphere, between the hand and the hot iron, and for a time that atmosphere is not too hot to be perfectly bearable. There are a number of these miracles of science, which we believe, however incredible at first sight they may appear, because they can be brought to the test of experience, and can be at any time reproduced under the necessary conditions. Houdin, the conjurer, in his very interesting autobiography — a little book I would really recommend to any of you who are interested in the study of the workings of the mind — speaks of it, and tells how he tried this experiment, after a good deal of persuasion; and he says that the sensation of immersing his hand in this molten metal was like handling liquid velvet.

THE PELISSE.

A Pelisse, if accordant to its name, is a coat of prepared skins, on which the hair has been preserved — a fur coat. In this country it is an article of female dress, having sleeves, which distinguishes it from a cloak or mantle, and covering the whole body from the neck to the ankles. The French, from whom the term is imported, consider a lining, or at least trimmings, of fur as a necessary constituent in the dress; so much so, that they give the name of

"la pelisse" to fur alone; but in this country pelisses are often made of woolen cloth, or of silk, even without trimmings.

King John ordered a gray pelisson with nine bars of fur to be made for the queen. The ecclesiastical surplice is connected with this robe. Monks having to celebrate early services at all times of the year in cold churches were permitted to wear *pellicæ*, coats of skins. A synod held in London in the year 1200 restricted the Black Monks and Nuns (Benedictines) to the use of lamb, cat and fox skins, with the view of preventing the spread of luxury in dress. These pelisses in time became worn and unsightly and were then covered with linen tunics during divine service. These were styled *super-pellicæ*, which by an easy transition became surplice.

ANTHRACITE COAL.

Anthracite coal was discovered in Pennsylvania soon after the settlement of the Wyoming Valley; but its first practical use was by Obadiah Gose, in his blacksmith shop, in the year 1768. In 1791, Philip Ginter discovered anthracite on the Lehigh. In 1792, Robert Morris, of Philadelphia, formed a company and purchased six thousand acres of the property on which Ginter discovered the coal. The company was called the "Lehigh Coal Mine." This company opened the mine, and found the vein to be fifty feet thick, and of the very best quality of coal. The company made every effort to secure a demand for the coal, but without success; and having become thoroughly disgusted with their speculation, leased the six thousand acres of this mammoth coal-field to Messrs. White and Hazzard, of Philadelphia, for twenty years, at an annual rental of *one ear of corn*. Messrs. White and Hazzard tried to use the coal in the blast furnace in 1826, but failed—the furnaces chilled. In 1831, Neilson conceived the idea of a hot blast for saving fuel, and in 1833, David Thomas adopted the idea of using the hot blast and anthracite together. White and Hazzard had, previous to this, formed a company and bought the property. In 1839, David Thomas made use of anthracite for making a pig metal a success, by which the twenty ears of corn were transformed into twenty millions of dollars. And this is the early history of the great Lehigh coal mines.

BUBBLES.

Blowing bubbles—what fun it is! Can anything be prettier than those fairy balloons, tinged with rainbow colors, as they float away in the sunlight? And we shall have to confess that, big as we are, we never see a group of children with their pipes and their soapsuds without wanting to go and help them—without an aching to get the pipe into our own hands and to send some of those tiny globes soaring off into space on our own account. The only drawback to this sport is that the bubbles so soon break. But by using the following simple mixture, which any older sister can prepare for the little ones, it is said that they will last much longer than when made in the old way:

Dissolve a quarter of an ounce of castile or oil soap, cut up in small pieces, in three-quarters of a pint of water, and boil for two or three minutes; then add five ounces of glycerine. When cold, this fluid will produce the best and most lasting bubbles that can be blown.

JOHN MACADAM, THE INVENTOR OF MACADAMIZED ROADS.

John Loudon Macadam was born in 1756, in Ayr county, Scotland, not far from the birth place of Robert Burns. His family was ancient and highly respectable. When he was little more than an infant, one of his uncles—William Macadam,—accompanied the British forces which came to America under Lord Loudon, during the old French war for the conquest of Canada. This uncle (William Macadam,) it appears, had something to do with supplying the British army with provisions; and when the war was over, instead of returning to Europe, he settled in the city of New York, where he became a thriving merchant. When John Macadam was fourteen years of age, his father died, and the boy was sent to America to become a member of the family of his uncle William, who procured him a place in the counting-house of a friend.

This was in 1770, when New York was a quaint old place, half English, half Dutch, situated at the end of Manhattan Island; the residue of which was verdant with woods and farms, and adorned with the villas and mansions of the wealthier citizens. People who are only acquainted with Manhattan Island now, when its beautiful groves are gone, its commanding bluffs dug away, its surface excavated and excoriorated for railroads and streets, can form no idea of its loveliness a hundred years ago, when John Macadam was a junior clerk.

Five years after his arrival in America, the revolutionary war broke out, and he was compelled to side for the king or the colonies. Being but nineteen years of age at the time, and of Scottish birth, (there is a great deal of Tory blood in Scottish veins), he espoused the cause of George the Third, along with his uncle William and a large majority of the wealthier merchants of New York city. In 1776, when he was still but twenty years old, General Washington was compelled to abandon New York, which, for the next seven years, was in the hands of the British. After a time, this young man received the important appointment of prize agent for the port of New York, which gave him a percentage upon the prizes brought in by British privateers and men-of-war. His percentage was probably pretty liberal, for he is reported to have gained a considerable fortune from his office.

Far indeed was it from the thoughts of the New York loyalists that the time would ever come when it would be beyond the power of their king to protect his faithful subjects in Manhattan. And yet that time came. In 1783, John Macadam, then twenty-seven years of age, with all the other Tories of note, was obliged to leave New York, and abandon so much of their property as they could not carry off.

On reaching his native Scotland, however, Macadam was rich enough to buy an estate in the county of Ayr, and that estate was large enough to make him an important man in the county. It was while he held the office of Ayrshire road trustee that he began seriously to study the subject of road-making. At that time roads were universally bad, except where Nature herself had made them good.

"A broad-wheeled wagon," wrote Adam Smith, in 1774, "attended by two men, and drawn by eight horses, in about *six weeks' time,* carries and brings back, between London and

Edinburgh (404 miles), near four ton weight of goods."

Dr. Franklin, writing in 1751, speaks of traveling seventy miles a day in England, by a post-chaise, as a most extraordinary achievement—killing to man and beast. Much of the soil of England and Scotland is a deep, rich clay, which makes the best farms and the worst roads in the universe; and yet it is particularly well adapted to the system of Macadam.

What it was which suggested to him the simple expedient of covering the soft miry roads with broken stones, averaging six ounces each in weight, has not been recorded. We only know, that, during the long wars between England and France, he held important appointments under the Crown, which made it his duty to superintend the transportation of supplies.

He then renewed the study of roads, and pursued it with all the unflagging perseverance of a thorough Scotchman. At his own expense, he traveled thirty thousand miles for the observation of roads, which occupied him more than five years, and cost him more than five thousand pounds sterling. It is presumed his idea was entirely original; for we cannot find any trace of a macadamized road previous to his day. The only notion which existed previous to his time, of making a permanent road, was to pave the whole surface with pebbles, blocks, or slabs of stone; either of which was far too expensive to become general.

It was not until 1811, when he was fifty-five years of age, that Macadam made his celebrated report to the House of Commons, in which he described the condition of the roads of Great Britain, and gave an outline of his system for repairing them. In 1815, a district was assigned him for an experiment. Need we say that he met with nothing but opposition, not only from every one connected with the old road system, but even from the farmers through whose lands the first macadamized road was to be made? Such was the prejudice against his plan that he could not get the old road-makers to execute his orders, and he was obliged to get his three sons to come and assist him in superintending the details.

But the tide soon turned. A good macadamized road is an irresistible argument; and there soon arose a rage for making such roads, as furious as the former prejudice against them. Four years after he began operations, there were seven hundred miles of macadamized road in Great Britain; and before the death of the inventor, out of the twenty-five thousand six hundred miles of high roads in England, there were not more, it is said, than two hundred and fifty miles not macadamized.

John Macadam was a strangely disinterested man. He not only refused to receive any reward for his services, including an offered knighthood, but he would not take a contract to make or repair a road, and he declined some pressing and liberal offers to take charge of the roads in foreign countries.

He was twice married; first, during his residence in New York, to a Long Island lady; and again, in his seventy-first year, to another American lady. He died in 1836, aged eighty years.

MAPS, globes and dials were first invented by Anaximander in the sixth century before the Christian era. They were first brought into England by Bartholomew Columbus, in the year 1489.

SUCTION.

Suction is a common term applied to the force of the atmosphere, and is simply weight or gravitation. Air, however, unlike some more solid substances, acts equally in every direction, up or down having no influence on its action. By the way, "up" and "down" are simply relative terms, having no absolute signification, but meaning simply toward or from the surface, or rather the center of the earth. The atmosphere which surrounds the earth exerts a pressure on it and every object upon it of about fifteen pounds to every square inch exposed to its action.

Now, if the air can be kept from acting on the under surfaces of bodies they would adhere to whatever surface they were placed upon and would stick or "suck," so that the object, if not too heavy could be lifted. Boys frequently cut out disks or circular pieces of leather and put a string through their centers by which to lift them. The leather being moistened with water can be pressed upon a smooth surface, and the edges adhering air-tight prevents the atmosphere from acting on the under surfaces. By this devise we have seen a common bucket, full of water, lifted with a "sucker" of only about four inches in diameter. It was done by the pressure of the atmosphere on the upper surface of the disk, amounting in the aggregate to over one hundred and ninety pounds, as the area of a disk four inches diameter is over twelve and a half inches, each sustaining the pressure of fifteen pounds.

So the water in the pump barrel is elevated by the pressure of the atmosphere on the surface of that on the outside of the pump. The upward movement of the plunger containing an upward lifting valve, draws or lifts the air out of the barrel between the plunger and the fixed valve near the bottom of the barrel. This creates a vacuum more or less perfect, and the pressure of the atmosphere on the outside of the barrel forces the liquid up through the fixed valve into the pump barrel.

The sucking of cider through a straw, which every boy who lives in the country has often done, is another exemplification of this same property in the atmosphere. The boy inserts one end of the straw into the cider, and with his lungs draws out the air, when the atmosphere at once lifts the cider up through the tube. If the straw was secured air-tight in the barrel, and no atmosphere admitted, or if the pump well was so covered in that no air could have access to the water, "suction" would be merely a name without any reality.

IMPROVED MUCILAGE.

Ordinary mucilage made from gum Arabic, does not fix paper to wood or pasteboard, or to metallic surfaces. These disadvantages are overcome by adding a solution of sulphate of aluminum, made up in ten times its quantity of water. Ten grains of aluminum sulphate are sufficient for 250 grains of mucilage. Prepared in this way it will not become mouldy. Again, according to Hirchburg, a few drops of strong sulphuric acid are added to the gum solution, and the precipitated sulphate of lime allowed to settle. Solutions prepared in this way a year and a half ago have neither become mouldy nor lost their adhesive power.

BRONZE FOR PRINTING IN GOLD.

Gold dust, for printing in gold, known under the name of bronze, comes mostly from Fuerth, in Bavaria. Fine cuttings of the metal are mixed with a sticky liquid and then ground like paints. Thus reduced to a powdered form, the sticky matter is separated from the metallic dust by washing in water, after which it is sifted into the various sorts. It is obtained in as many as fifteen grades of fineness and in the different colors — white, (made from silver leaf), pale yellow, orange, green and red. In printing in gold, the impressions are first struck off in printers' gold size. The gold or bronze dust is then applied by means of a cotton tuft or brush of short fur. If it is desirable to have very rich gilding, bronzes of various colors may be used. Care must be taken that the paper which is used for the bronzing process be perfectly dry.

WHEN THE OIL SPRINGS WERE FIRST DISCOVERED.

A full century ago the existence of oil springs in Western Pennsylvania was a published and well-established fact. In the *Massachusetts Magazine,* published in 1789, we find the following in relation to them: "In the northern part of Pennsylvania there is a creek called Oil Creek, which empties into the Alleghany river. It issues from a spring on the top of which floats an oil similar to that called Barbadoes tar, and from which one may gather several gallons a day. The troops sent to guard the Western posts halted at this spring, collected some of the oil and bathed their joints with it. This gave them great relief from the rheumatism, with which they were afflicted. The water, of which the troops drank freely, operated as a gentle purge.

"There is still earlier evidence of the existence of the oil springs than this. It is found in an old book published in 1772, entitled 'Travels in North America,' by Peter Kalm. On a map in this volume, the exact location of the oil springs is given."

We take this from an exchange; but this is still far behind. As early as 1629, almost a century and a half before Kalm's book appeared, a Franciscan missionary, Joseph de la Roche d'Allion, who crossed the Niagara river into what is now New York State, wrote a letter in which he mentions the oil springs, and gives the Indian name of the place, which he explained to mean, "There is plenty there." His letter was printed in Sagard's "Histoire du Canada," in 1632, and subsequently in LeClercq.

THE WOODPECKER'S FORESIGHT.

The woodpecker in California is a storer of acorns. The tree he selects is invariably of the pine tribe. He bores several holes, differing slightly in size, at the fall of the year, and then flies away, in many instances to a long distance, and returns with an acorn, which he immediately sets about adjusting to one of the holes prepared for its reception, which will hold it tightly in its position. But he does not eat the acorn, for as a rule, he is not a vegetarian. His object in storing away the acorn exhibits foresight, and knowledge of results more akin to reason than to instinct. The succeeding winter the acorn remains intact, but becoming saturated is predisposed to decay, when it is attacked by maggots who seem to delight in this special

food. It is then that the woodpecker reaps the harvest his wisdom has provided, at a time when, the ground being covered with snow, he would experience a difficulty, otherwise, in obtaining suitable or palatable food. It is a subject of speculation why the redwood cedar or the sugar pine is invariably selected. It is not probable that the insect, the most dainty to the woodpecker's taste, frequents only the outside of two trees; but true it is, that in Calaveras, Mariposa, and other districts of California, trees of this kind may be frequently seen covered all over their trunks with acorn, when there is not an oak tree within several miles.

TIME, SPACE AND POWER.

Persons who have not studied the principles of mechanics, often deceive themselves with regard to the power of levers and wheels; and many men of an ingenious turn of mind have spent time, money and labor, in designing and constructing machines to gain power by levers, wheels and pulleys. No power can be gained by any arrangement of such devices. The power of any machine is the force which sets and keeps it in motion; the levers, wheels and pulleys are only mechanical devices for transmitting the power to some other point, whether it be for the hoisting of barrels or boxes. by block and tackle, the turning of a locomotive wheel, or the paddles of a steamship. By the use of a lever a man can raise a greater weight than he can by hand, but he could raise this weight in the same time, by hand, if it were divided into two or more parcels. This is an immutable law of mechanics. No man who understands it will ever engage in the futile search for a perpetual motion.

WHAT A DEED OF A FARM INCLUDES.

The following is from an address of Hon. Edmund H. Bennet, delivered before the Massachusetts State Board of Agriculture:

Of course everyone knows it conveys all the fences standing on the farm, but all might not think it also included the fencing stuff, posts, rails, etc., which had once been used in the fence, but had been taken down and piled up for future use again in the same place. But new fencing material just bought and never attached to the soil would not pass. So piles of hoop-poles, stowed away, if once used on the land have been considered a part of it; but loose boards or scaffold poles laid loosely across the beams of the barn and never fastened to it would not be, and the seller of the farm might take them away. Standing trees, of course, also pass as part of the land; so do trees blown or cut down and still left in the woods where they fell, but not if cut and corded up for sale; the wood has then become personal property.

If there be any manure in the barnyard, or in a compost heap on the field, ready for immediate use, the buyer ordinarily takes that, also, as belonging to the farm; though it might not be so if the owner had previously sold it to some other party, and had collected it together in a heap by itself. Growing crops also pass by the deed of a farm, unless they are expressly reserved, and when it is not intended to convey these it should be so stated in the deed itself; a mere oral agreement to that effect would not be valid in law. Another mode is to stipulate that possession is not to be given until some future day, in which case the crops or manure may be removed before that time.

As to the buildings on the farm, though generally mentioned in the deed, it is not absolutely necessary they should be. A deed of land ordinarily carries all the buildings on it belonging to the grantor, whether mentioned or not; and this rule includes the lumber and timber of any old building which has been taken down or blown down and been packed away for future use on the farm.

But if there be any buildings on the farm built by some third person, with the farmer's leave, the deed would not convey these, since such buildings are personal property, and do not belong to the landowner to convey. The real owner thereof might move them off, although the purchaser of the farm supposed he was buying and paying for all the buildings on it. His only remedy in such case would be against the party selling the premises. As part of the buildings conveyed, of course the window-blinds are included, even if they be at the time taken off and carried to a painter's shop to be painted.

It would be otherwise if they had been newly purchased and brought into the house but not yet attached or fitted to it. Lightning rods also go with the house, if a farmer is foolish enough to have any on his house. A furnace in the cellar, brick or portable, is considered a part of the house, but an ordinary stove with a loose pipe running into the chimney is not, while a range set in brick work is. Mantel-pieces so attached to the chimney as not to be removed without marring the plastering go with the house, but if merely resting on brackets they may be taken away by the former owner without legal liability. The pumps, sinks, etc., fastened to the buildings are a part of it in law, and so are the water-pipes connected therewith bringing water from a distant spring. If the farmer has iron kettles set in brickwork near his barn for cooking food for his stock, or other similar uses, the deed of his farm covers them also, as likewise a bell attached to his barn to call his men to dinner. If he indulges in ornamental statues, vases, etc., resting on the ground by their own weight merely, and sells his estate without reservation, these things go with the land.

GLYCERINE.

A viscid colorless liquid having a sweetish taste but no odor which may be derived from nearly all oily or fatty substances. It was discovered by Scheele in 1779. It unites readily with water and the combination thus formed as well as the pure glycerine is capable of solving a great variety of substances. It is obtained by various processes the object being to detach it from its combination with the acids oleic margaric and stearic to which it is united as a base. The refuse of soap making contains a large proportion of it which has usually been thrown away. It will not freeze even at very low temperatures. At ordinary temperatures it is probably one of the least volatile liquids known. Its soothing and healing properties render it a valuable remedy for the diseases of the skin, resulting in chapped hands, sore nose, salt rheum, and many other similar affections. It is often so impure that it acts as an irritant rather than as a healing agent. To test its purity it should be agitated with sulphuric acid. If pure, its color will change to a light brown, with scarcely any evolution of gas. If impure, large quantities of gas will be given off, which ceases upon stopping the agitation, and is again renewed upon a renewal of the shaking.

THE SEWING MACHINE—ITS ORIGIN.

In the year 1825, there lived in the city of Saint Etienne, in France, a poor and obscure tailor whose patrons were few and far between. His carelessness about the work intrusted to him, joined to his eccentric habits, obtained for him throughout the neighborhood an unenviable reputation, the natural consequences of which were that his business declined from day to day and he ended by becoming a veritable pauper. In 1827, he was considered as laboring under the constant influence of hallucinations, and in 1829, he was universally regarded by the gossips of his precinct as insane.

This madman was no other than Barthlemy Thimmonier, the inventor of the first sewing machine. He was born at Abreste in the year 1793, and was the son of a dyer of Lyons.

It is an old custom with many manufacturers of the south of France, to give out large quantities of needle-work and embroidery to the country girls residing around their establishments. This attracted the notice of Thimmonnier and originated in his mind the first idea of a sewing machine. On its construction he worked without any help or money during four successive years, at the expiration of which, in 1830, he obtained his letters patent.

A government engineer by the name of Beaunnier, living at Saint Etienne at the time, examined the machine, and appreciating at a glance the value of the invention, took the tailor with him to Paris, where a firm was soon started under the title of "Ferrand, Thimmonnier, Germain, Petit & Co.," with a view to the profitable working of the patent.

In 1841, in the Rue de Sevres, might have been seen a workshop, in which eighty wooden sewing machines were constantly employed in making army clothing.

That same year, however, the tide of a fierce revolutionary outbreak swept over France, and the laboring men of the capital, in their blind and ignorant fury, saw in this new substitution of machinery for manual labor, nothing but a means of robbing their wives and daughters of their daily bread. The consequence was exactly the same as in the case of the canal boatmen of Munden, who destroyed the first steamboat started there in the year 1707, and of the Belgian weavers, who some years ago broke up the first flax-spinning machinery imported from England into the city of Ghent. An armed and infuriated mob smashed all of Thimmonnier s machines, and he himself had to flee for his life.

Soon after this, Baunier died, and the firm of Germain, Petit & Co. was dissolved, leaving our poor tailor out in the cold.

In the year 1834, Thimmonier returned to Paris, and having improved his machine, attempted to make a living by taking in sewing. In this, however, he failed, and was at length obliged to walk all the way back to his native home with his machine upon his back, exhibiting it as a curiosity along the road, in order to enable him to purchase his daily meals.

After this sad experience, it would be thought Thimmonnier would have given up the matter in despair, but, on the contrary, he went to work and constructed several new machines, which he disposed of with great difficulty.

In the year 1845, the date of Howe's patent in America, the French machine was already making two hundred stitches a minute.

M. Magnin, of Villefranca, at this crisis joined our inventor, and, furnishing the necessary funds, the construction of ten-dollar machines was at once begun by them, with a fair prospect of pecuniary reward. In 1848, these machines made three hundred stitches per minute, and could sew and embroider any material, from muslin to leather inclusive. The wood-work had now also been replaced by metal.

In the memorable month of February, 1848, another convulsion of the people took place in France, and for the second and last time were Thimmonnier's hopes of success entirely blighted, both himself and his partner being completely ruined by it.

He sold his English patent to a Manchester company for a trifle, sent his best machine, in 1851, to the great London Exhibition, but too late to be noticed; and, finally, after thirty years of a life of incessant struggle and adversity, he died, at the age of 64, in the greatest poverty, on the 5th day of August, 1857, at a place called Amplepuis.

While our poor tailor was starving in Europe, the sewing machine was being perfected on a new principle, in the United States, and in 1845, Elias Howe, Jr., obtained his patent, out of which he eventually made quite a large sum of money.

HOW TO MAKE A NOON-MARK.

Persons who live where there is no standard time, can easily keep a clock right by a noon-mark. When the shadow falls on the mark set the clock slow or fast, according to our table of clock slow or fast, for that day. There are four days in the year when sun and clock are exactly together at noon; these days are, April 15th, June 15th, September 1st and December 24th. A correct noon-mark may be made on either of these days by a watch that is known to be right by some standard time; on other days of the year by using our table of clock slow or fast.

Thus, on January first make the mark at the edge of the shadow when the time is four minutes past twelve by the correct watch. If you cannot readily get the correct time, you may make a noon-mark any clear night, as follows: Hang up two plumb-lines out of doors in such a position that on sighting from one to the other the North Star will be exactly in range; then drive down two stakes exactly in place of the two lines; the shadow at noon from one to the other will be near enough north and south to make a very accurate noon-mark. This mark can be made by a compass, if the *magnetic variation* is allowed for by an experienced engineer.

FIRST PIECE OF AMERICAN SILK.

A short time before the year 1800, Walter Allen, living in Union Village, R. I., (which is now North Smithfield,) was married to Miss Lucy Buffum, daughter of William Buffum, who lived near Slatersville. The bride wore on the occasion a silk dress entirely of her own make. She tended the silk worms, reeled the silk from the cocoons, spun it, colored it, wove it, and made the dress. It was a beautiful heavy-ribbed, dark brown silk, pieces of which are now carefully treasured by members of the family. It would be called in these days an excellent piece of silk. A lady of Providence, ninety years old, remembers the fact, and says that it was stated at the time that this was the first piece of silk manufactured in this country.

CEMENT FOR METAL AND GLASS.

To cement metal to glass, mix two parts of powdered white litharge and one part of dry white lead into a dough with boiled linseed oil and lac copal. Coat the metal with this cement, and gently press the glass into it. Litharge when mixed with glycerine makes a very strong cement provided the glycerine be pure and free from water. This latter mixture has been recommended for making glass stoppers tight in bottles, but it was discovered that when they were put in with it they utterly refused to come out, the mixture forming a very good cement. Its uses are very wide.

THE UNCERTAINTY OF INVENTION HONORS.

Some of the most valuable inventions have descended to us without the names of the authors having been preserved. We are the inheritors of an immense legacy of the results of labor and ingenuity, but we know not the names of our benefactors. Who invented the watch as a measurer of time? Who invented the fast and loose pulley? Who invented the eccentric? Who, asks a mechanical inquirer, invented the method of cutting screws with stocks and dies? Whoever he might be, he was certainly a great benefactor to his species. Yet (adds the writer) his name is not known, though the invention has been so recent. This is not, however, the case with most modern inventions, the greater number of which are more or less disputed. Who was entitled to the merit of inventing printing has never yet been determined. Weber and Senefelder both laid claim to the invention of lithography, though it was merely an old German art revived. Even the invention of the penny postage system by Sir Rowland Hill is disputed; Dr. Gray, of the British Museum, claiming to be its inventor, and a French writer alleging it to be an old French invention. The invention of the steamboat has been claimed on behalf of Blasco de Garay, a Spaniard; Papin, a Frenchman; Jonathan Hull, an Englishman; and Patrick Miller, of Dalswinton, a Scotchman. The invention of the spinning machine has been variously attributed to Paul, Wyatt, Hargreaves, Higley and Arkwright. The invention of the balance spring was claimed by Huyghens, a Dutchman; Hautefeuille, a Frenchman; and Hooke, an Englishman. There is scarcely a point of detail in the locomotive but is the subject of dispute. Thus, the invention of the blast pipe is claimed for Trevithick, George Stephenson, Goldsworthy Gurney, and Timothy Hackwarth; that of the tubular boiler by Seguin, Stevens, Booth, and W. H. James; that of the link motion by John Gray, Hugh Williams and Robert Stephenson.

Indeed, many inventions appear to be coincident. A number of minds are working at the same time in the same track with the object of supplying some want generally felt; and guided by the same experience, they not unfrequently arrive at like results. It has sometimes happened that the inventors have been separated at great distances, so that piracy on the part of either was impossible. Thus Hadley and Godfrey almost simultaneously invented the quadrant, the one in London, the other in Philadelphia; and the process of electrotyping was invented at the same time by Mr. Spencer, a working chemist at Liverpool, and by Professor Jacobi, at St.

Petersburg. The safety lamp was a coincident invention, made about the same time by Sir Humphrey Davy and George Stephenson; and perhaps a more remarkable instance of a coincident discovery was that of the planet Neptune, by Leverrier, at Paris, and by Adams, at Cambridge.

PEOPLE OF THE WORLD IN SMALL SPACE.

Few are aware of the vast number of people that can be placed in a small space. When we speak of millions of men, we are apt to picture to ourselves an almost boundless mass of humanity; yet a million of people standing together, each person occupying four square feet, could be placed on a patch but little more than a mile square. A square mile will accommodate 7,965,000. The whole population of the United States would hardly cover two and a half miles square, and the population of the entire world could easily be accommodated on a tract twelve miles wide—less in extent that some townships.

THE NUMBER OF EGGS FROM A HEN.

A German naturalist answers the question how many eggs a hen can possibly lay, as follows: The ovary of a hen contains about six hundred embryo eggs, of which, in the first year, not more than twenty are matured. The second year produces one hundred and twenty, the third one hundred and thirty-five; the fourth, one hundred and fourteen, and in the following four years the number decreases by twenty yearly. In the ninth year only ten eggs can be expected, and thus it appears that after the first four years hens cease to be profitable as layers.

DISTILLATION OF PERFUMES.

The invention of this process is ascribed to Avicena, an Arabian doctor, who flourished in the tenth century. Previous to his time, resins, spices, and oils or ointments, scented by contact with fragrant substances, were the chief, if not the only, forms of perfume known. To him, it is said belongs the honor of first separating the aromas of plants and flowers in such a manner that they could be readily applied where greasy unguents and smoking incense were alike unavailable.

To the invention of Avicena we are indebted for the most durable elements of modern perfumery; but our most fragrant and delicate odors are produced by another process, of much later discovery, which we will attempt to describe in the paragraphs that follow.

The odors of all vegetable matters reside in a principle or constituent known as essential oil, or more properly, otto. Each individual plant or flower contains a greater or less amount of this principle, the separation of which from the parent substance is the initial movement in all the most important of the perfumer's operations. As it exists in but small proportions, we have in it when isolated a remarkable concentration of odor, and its stability when so separated is so great that many varieties can be kept for years unchanged. In the otto we not only possess the fragrance of the flower long after the season of blooming is past, but by its use can impart a favorite odor to a thousand bodies scentless in themselves.

Ottos are all in the liquid form, are of an oily appearance, vary in color from light straw to dark red or brown, and possess, as before stated, the odor

of the substances from which they are derived. The yield of this principle from various materials ranges from six per cent. or more down to very minute quantities. Nutmegs, for instance, are very rich in otto; lemon rinds contain it in such abundance that it can be profitably extracted by expression; while roses yield so little that but three teaspoonfuls are obtained from a hundred pounds of the petals.

The well-known process of distillation is the method most frequently employed to procure these ottos. The process, as almost every one knows, consists essentially in vaporizing a liquid in a closed vessel, and conducting the vapor to a receiver, in which it is condensed by the application of cold water. When a given plant or flower is placed in the still with a proper proportion of water, and heat applied, its otto, being volatile, rises with the steam, and both being condensed together, they readily separate on cooling. When applied to this purpose the process is often conducted by passing steam through the material to be exhausted instead of boiling it in the usual way.

THE MANUFACTURE OF TYPE.

The processes connected with the manufacture of the "leaden messengers of thought" are unknown to the vast majority of the community, even among printers. A visit to the Chicago Type Foundry furnishes us with the necessary *data* for a brief description of the *modus operandi* of their fashioning.

The first process is that of cutting the letter in fine steel, forming the *punch*. This punch is driven into a piece of polished copper about one-half inch square by $1\frac{3}{4}$ inches long, which, in turn, is sent to the fitter to be finished and fitted as the *matrix*, which is only the mould for the face of the letter. The *mould* proper is for the body upon which the letter stands, and is made of hardened steel. The matrix and the mould are then placed in the casting machines — curious and compact specimens of mechanical skill — when a tiny pump forces the molten metal into them, forming the type. In small fonts, where frequent changes are made in the moulds, the machines are driven by hand power; but when the fonts are large, as for daily newspapers, steam is used as a motor, and the industrious little machines, with scarcely less than human intelligence, go thumping along at their work, requiring but little care or attention, except when changes in the letter and moulds become necessary.

Type metal is a composition of lead, tin, antimony and copper, all of which metals are required to give the necessary ductility, hardness and toughness.

Each letter, as it leaves the machine, has attached to its bottom a wedge-shaped jet, somewhat similar to that of a bullet cast in a hand-mould. The loose types are placed upon a table, where a boy rapidly picks them up, at the same time breaking off the jets. This still leaves a bur at the shoulder of the type, which is taken off by *rubbers*, girls seated at a table on which there are placed steel files made expressly for this purpose. The letters then pass to the *setters*, who set them in long lines in wooden sticks, each sort or kind by itself. They then go to the kerning machine, where such letters as f, j and Italics, which have a part of the face jutting over the body, are dressed on the side, on a rotary cutter, which dresses it without destroying the kern. The types then go

to the *dresser*, who, with a sharp plane, grooves the bottom to take off the bur remaining from the breaking, and with a square steel rod dresses the upper and under sides, giving the polished, silvery appearance so familiar in unused type.

Then follows the process of *picking* — that is, the examination of each individual letter, by the aid of a magnifying glass, that no defective letter may be sent out. The types are then made up in shorter lines, and the lines into pages, put in paper wrappers, and sent to the dividing room, where they are divided into fonts, each font having its due proportion of the various sorts. They are then sent to the office, packed, marked and shipped to the printer. This is the way the type on which this book is printed was made; and after it was set up in pages of the size before you by the printer, it was sent to the electrotyper, who made the plates, as described in another article in this book.

GREAT STONES.

Some of the blocks of granite used in the construction of the Treasury building at Washington are the largest ever moved in this country, and they were carried from the eastern part of Maine. They were transported to Washington by water, and after their arrival there moved by ox-power upon a sort of double pulley system, a distance of two miles to the spot where they were wanted for use. The work of moving them was performed with comparative ease, not more than eight or ten yoke of oxen being employed to move a block weighing more than seventy tons. The fluted pillars, great numbers of which are used in the building, are forty feet long, and weigh fifty tons at least. The largest blocks, thirty to forty feet square, and three feet thick, weighed upward of seventy tons. The facility with which these large blocks were moved and fixed in their places was a source of wonderment, and seemed to admiring spectators to be the perfection of mechanical skill and ingenuity. And yet how insignificant the achievement when compared with the triumphs of ancient art. In the foundation of the great Temple of the Sun at Baalbec may still be seen, even in the second course, stones which are thirty-seven feet long and nine feet thick; and under these, and about twenty feet from the ground, three stones which alone occupy one hundred and eighty-two feet in length by twelve feet high. These three stones are estimated to weigh nine hundred tons each! But we read of an Egyptian idol-temple, Buris, far surpassing this, in which there was a sanctuary composed of a single block of granite sixty feet square. This is the largest and heaviest stone mentioned in the history of nations.

LONG AND SHORT DAYS.

At Berlin and London, the longest day has sixteen hours and a half; at Stockholm, the longest day has eighteen hours and a half; at Hamburg, the longest day has seventeen hours and the shortest seven; at St. Petersburg, the longest day has nineteen and the shortest five hours; at Tornea, Finland, the longest day has twenty-one hours and a half, and the shortest two hours and a half; at Wanderhus, Norway, the day lasts from the 21st of May to the 22d of July, without interruption; and at Spitzbergen, the longest day has three months and a half.

USEFUL COMPOUND.

A composition has been patented in London for manufacturing molded articles from a mixture of the asphaltum of tar and fine brick dust. This asphaltum is the residue left in the retorts in distilling gas tar to obtain naptha; it is kneaded with one part of brick dust, and then molded into the desired form for picture frames, or any other article desired. From such cheap materials it is thought that a composition may be made which can be vulcanized, and from which articles like canes and combs, may be manufactured. In Paris a compound of albumen and sawdust is proposed for the manufacture of various molded articles. Pure albumen, obtained either from eggs or blood, is slightly diluted with water, and in this fine sawdust is soaked; it is then submitted to severe pressure in a press, after which it is forced into metal molds, which should be kept heated during the process of fabrication. As soon as the molding is completed, the mold is plunged in cold water to cool the articles.

ALMANACS.

Almanacs are generally supposed to have originated with the Arabs, as the term is composed of two Arabic words signifying "Diaries." The superstitious beliefs to which the habits of life of this people inclined them, the wild and desolate localities in which their temporary habitations were fixed, as well as their monotonous existence, rendered them peculiarly liable to be impressed by the mysterious practices of star-gazers and soothsayers. Such was their fanatical reliance upon the influence which the movements of the various heavenly bodies were supposed to exert, that not only important expeditions, but even ordinary domestic duties, were determined by the divinations of the astrologer. It was but natural, then, that treatises descriptive of the various changes of the heavenly bodies, and speculations and prophecies with them, should constitute the earliest species of literature among such a people. Accordingly, historians inform us that scarcely an Arabian or Mohammedan family could be found, in which the almanac was not among their most valued possessions. In the progress of years these publications were introduced among other nations, who almost universally imitated the peculiar style of the Arabians; and, until a comparatively recent date, calculations relating to the heavenly bodies everywhere constituted a principal feature of the almanac. A great variety of almanacs in manuscript form, prepared during the middle ages, are still to be found in many of the libraries of Europe, and afford the curious student a fund of interesting information.

The first printed almanac of which we have any authentic evidence, appeared about the middle of the 15th century. In 1774, a series of these works, printed in both the German and Latin languages, was introduced by a celebrated German mathematician, and for thirty years maintained an uninterrupted popularity. Although their contents were mainly speculations relating to the localities and movements of the heavenly bodies, such was the estimation in which they were held, that the exorbitant price of ten golden crowns each was demanded and paid without hesitation.

In France during the 16th century, the contents of the almanac were varied by the introduction of political

diatribes reflecting severely upon prominent statesmen and officials; and this was soon supplemented by a record of clerical dignitaries, and the genealogies of eminent personages, particularly of those connected with the royal family.

In England, until the year 1828, astrological almanacs disseminated broadcast the seeds of fanaticism and superstition, notwithstanding the fact that their publication was, by royal decree, subject to the inspection and approval of the highest prelates in the British realm. The uneducated and irreligious taste of the age demanded the irrational jargon and senseless mummeries of charlatans and mountebanks. It is a noteworthy and significant fact that, even at as late a period as the close of the 18th century, almanacs in which all reference to the *influence of the moon upon the various members of the human body* was excluded, proved entirely unsaleable. But in 1828, a radical change was effected in public sentiment, by the "Society for the Diffusion of Useful Knowledge." Through the efforts of this Association a more enlightened taste was introduced among the people, and in a brief period the occupation of the astrologer, which till then had yielded a princely revenue, ceased to be remunerative. Under the auspices of this society, the publication of the "British Almanac," a work replete with interest and instruction, proved a most efficient auxiliary in the reformation of public sentiment. The press of England earnestly endorsed their philanthropic spirit, and belabored with satire and invective the mercenary publishers who had so long pandered to the popular superstitions of the age. Other almanacs of equally meritorious character, several of which are still prosperous, were speedily projected, and the liberal encouragement with which they were received attests the more enlightened taste of the people.

Germany, Belgium and France each have publications of this character which are held in high esteem. While those of the first named countries, with few exceptions, repudiate supernatural beliefs and the practice of magic arts, the most attractive features of the almanacs of the French are their superstitious fancies and fanaticism.

In this country Franklin's "Poor Richard's Almanac," published in 1732 —nearly one hundred years prior to the first issue of the British Almanac —at once achieved great popularity, and its success is an index to the genius of the people of his age. At the present day our almanacs are as radically varied in their contents, as the nationalities represented by our population, and each truthfully reflects the tastes of the class by whom it is patronized. Trivial as the unreflecting may be disposed to regard this species of literature, the history of almanacs, with a synopsis of their contents at different epochs, from their first introduction to the present day, would present an accurate portraiture of the gradual advances of the human race in civilization and refinement.

NOISE IN SHELLS.

There are few of us who do not remember the childish wonder we once felt at hearing the resonance produced by placing a sea-shell to the ear,—an effect which fancy has likened to "the roar of the sea." This is caused by the hollow form of the shell and its polished surface, enabling it to receive and return the beatings of all sounds trembling in the air around the shell.

INDIA RUBBER.

Remembering the almost endless variety of uses to which Caoutchouc is now applied, we are almost amused at the first idea that prevailed concerning its utility. These are suggested by the name originally given to it, and by which it is still, to a great extent, known — India Rubber. One of the first instances in which it is mentioned as a useful article is in a work of Dr. Priestley, published in 1770, in which he speaks of it as a substance *which had just been brought to his notice*, and was admirably suited to rubbing out pencil marks; and he adds that it was sold at the rate of three shillings sterling for a cubical bit of about one-half an inch.

Though so great a chemist as Dr. Priestley had not known of this substance before, attention had been called to it as one of the products of Peru as early probably as 1735, and to a greater or less extent it had been used for "rubbing out marks" from a period probably not very long subsesequent to its discovery. Anything coming over the seas from the far East or remote West, in those days, was called Indian, and hence the name — India Rubber. But the natives called it *Cahuchu*, and hence, by only a slight modification of sound, came the name "Caoutchouc" — by which it is now more commonly, and perhaps correctly, called.

As is well known, Caoutchouc is the gum, or, more properly, the dried sap, of a tree. The tree producing it abounds in various parts of South America, and also in the East Indies. In the latter region especially this tree is represented as one of the noblest in the whole forests where it grows, being not infrequently as much as seventy-five feet in circumference and one hundred feet high, and crowned with a luxuriant foliage, so that it can be seen miles away. The product, however, of this Eastern tree is not regarded as equal to that of the American.

The method of obtaining the gum is similar in both regions. The tree is tapped at various points along the trunk, and even up the larger branches. the fluid which runs out being generally caught in a little cup which hangs beneath the incision. About a gill is received from each incision in the course of the day. The method of afterward preparing this for the market varies somewhat. Formerly it was allowed to run slowly over some clay mould which was of the shape desired, and the successive layers of it dried, much as heated tallow, for example, is cooled in successive coats or layers upon the old-fashioned dipped candle. The mould afterward was broken away, which left the rubber in the shape in which the mould had formed it. In this manner great numbers of bottles and various fanciful figures were made and exported from Para, which has always been a chief seat of this trade. It is not many years since rubber shoes were altogether made in this way. Brazil used to export several hundred thousand pairs of these shoes annually.

The fluid, when it runs from the tree, is of a whitish color, or more nearly transparent; and this appearance it still retains when dried in the sun. But to hasten its drying a fire is more commonly used, and the smoke from this colors the gum black, as we generally see it.

The common method of preparing it is to build a palm-nut fire, over which an earthen jar is placed, with a hole in the bottom so arranged that

the smoke from the fire shall ascend through the jar. By this an Indian sits with his vessel of the fluid which has been collected from the trees. Having a small wooden paddle, he dips it into the fluid, which he then holds over the smoke till the gum becomes hardened, when he dips again, repeating the process till he has the stick covered with the hardened gum of the required thickness. This is then cut off, and he is ready to begin again; and so he repeats his work, day after day. A good day's work is six pounds. More or less impurity is always found in the rubber so prepared, but, besides this, sand or other material, sometimes is purposely introduced between the layers of gum, in order to increase the weight.

Another method of bringing Caoutchouc to market has been to filter the fluid as it comes from the trees, and mix it with strong ammonia, in the proportion of about two ounces of the latter to, say, two and a quarter pounds of the former. The mixture is well shaken and placed in air-tight vessels of either glass or tin, which are then hermetically sealed. From these vessels, when afterward it is desired for use, the gum is run out upon any smooth surface and exposed to a temperature of seventy to a hundred degrees, when the ammonia evaporates and leaves the rubber in the form of the object that holds it. Imported in this manner, it is accounted much better than when dried. As before stated, there is also a difference between the products of different regions, the American being accounted better than the East Indian. That from the older trees is also better than the product of young ones; and that which runs in colder weather is better than that in warm.

All through the Amazon valley, and up its tributaries, these rubber trees abound. People from the lower Amazon are now moving as far up as Bolivia to gather this gum. In Northern Bolivia it is said there are immense groves of rubber trees as yet untouched; and the demand, which is so rapidly increasing, will, at no distant day, send many adventurous settlers thither to bring away rich returns from the newer fields of this traffic. The entire product of the Amazon Valley has very greatly increased of late years. In 1870, it amounted to some eleven and a half million pounds. Yet the drain upon the resources of those immense forests has hardly begun.

MANUFACTURE OF INDIA RUBBER.

The juice of the Caoutchouc tree undergoes many curious mutations before it becomes a merchantable sheet. In a large building, filled with great iron troughs and odors far from spicy, many men are at work on the rough rubber, which is first cut into pieces and then partially macerated and washed clean from impurities, emerging at length in the form of long strips of a dirty-white color, not unlike fragments of unbleached Turkish toweling. It is now ready for the macerating mills, wherein it is worked up with hot water till it assumes the appearance of the chewed India-rubber dear to school boys. As the macerator slowly revolves, it squeezes from its capacious jaws a dark-looking viscid mass, only to sieze it again and repeat the operation until the material becomes homogeneous, when it is ready for the cylinders. In these it is squeezed, under heavy pressure, through sieves of exceeding fineness, which take up

every remaining particle of dirt or grit, and the rubber is now ready to be rolled into thick or thin sheets — or applied to cylinders under which pass miles of silk or cotton cloth, until, after some half dozen applications, a coating of sufficient thickness to make it waterproof has been deposited on the fabric — or to be cast in moulds into valves or buffers. "Washers," and such small deer, are cut out of the heavy sheets, which are also employed for making the mats now so much in use. These are produced by a singularly beautiful process applied to sheets of vulcanized Caoutchouc. This vulcanizing operation is simple enough, consisting merely of the addition of a quantity of sulphur — often combined with coloring matter — to the wet paste of rubber, followed by baking in large iron ovens filled in with lime. Charged with sulphur the rubber is rolled into long bands, of about half the width of the proposed mats. These bands pass on a traveling bed under a machine furnished with sharp cutters, which inflict stabs at regular distances, and finally cut off the band into lengths. These are next stretched on a frame so as to tear the wounds into almost lozenge-shaped openings, forming a perfect pattern ; a process far superior in economy to that of punching out the interstices, and thus involving waste of labor and material. Stretched on frames the mats are now duly baked, and, on leaving the oven, retain perfectly the form imposed upon them. To this process of vulcanizing, rubber owes much of its adaptability to many uses of modern life. The addition of sulphur, followed by baking in lime, imparts to the material the power of resisting heat, and has extended the area of India-rubber goods to the torrid zone. Carried a step further, this process produces ebonite, a material of great hardness and density, of which all kinds of articles, useful and ornamental, may be made ; among which may be mentioned the cheap imitations of jet, which have the advantage of being far more durable than the hydrocarbon imitation.

HOW TO FURNISH A HOUSE.

The New York *Times* draws a picture of the time when our houses shall be furnished as they should be : Heavy rugs will partly cover the polished floors. Paper of some neutral tint, free from glaring figures, will stretch from the richly colored dado at the bottom to the gay border at the top. The picture rod will not be of the eternal gilt that wearies us now. It will be painted some decided color that will harmonize with the prevailing shade of the whole room. Before the windows and before the doors which open outward, curtains, heavy in texture and subdued in tone, edged with strong lace, will hang from wooden rings which move freely on a slender wooden rod fastened to the sheathing. Rings and rod will be of the hue of the picture-rod above. The single curtain before each opening will be looped to one side ; low book cases, not over three feet high, of dark wood relieved by a few chiseled designs picked out in color, will line the wall. No glass doors will disfigure them. One general pattern varied in each piece, will stamp the furniture. Last and greatest, an open wood fire, either in the fireplace or in one of the Franklin stoves which still lurk in the garrets of old country houses, will cast its cherry light over everything. The close stove, the register, the grate, and the radiator

will be tabooed. The blaze of wood burning across brazen andirons is something so beautiful that no artist has ever succeeded in painting it. The first of all hints on household tastes should be: Have an open wood fire in the room in which you mean to live.

THE HOME OF THE DOLLS.

ORIGIN OF THE SONNEBERG TOY INDUSTRY.

The Sonneberg toy industry, which arose in the southwestern part of the Thuringian Forest, belonging to the duchy of Saxe-Meiningen, dates from the thirteenth century. At first the articles manufactured were of the very rudest description, wooden shingles, staffs, jugs, plates, etc., which were carved by the inhabitants of the mountain villages, wood-cutters and charcoal-burners, who thus made use of their leisure time. Some of these poor mountaineers then gathered together these wares, and, heavily loaded, wandered with them into Franconia, where they disposed of them and returned to the mountains, with meal, wool, cloth or whatever else they wanted for themselves or neighbors. It was a dangerous life for these poor fellows, for highway robbers were very plentiful, and many a poor toy dealer was robbed of all he possessed and sometimes even murdered. In the following century, however, a great improvement took place in the condition of the dwellers of Thuringia. A highway from Augsburg to Leipsic and Dresden was made through the forest; and thenceforward caravans of Augsburg and Nuremburg traders passed along the route, and in returning purchased the manufactured wares from the villages. Then the merchants brought to the mountaineers better models from the Berchtesgaden toy makers, taught them how to paint their manufactures and improve them that they could be exported as the wares of Berchtesgaden or Nuremberg. This was the commencement of the Thuringian toy industry. Then some of the more enterprising toy makers commenced business as merchants on their own account. Sonneberg, then a little place of but 700 inhabitants, became the recognized centre of the trade, and has remained so up to the present time. From 1710 to 1740, Sonneberg merchants established branches in St. Petersburg, Stockholm, Copenhagen, Christiana, Lubeck, London, Moscow, Archangel and Astrakan.

THE GOOD OLD TIMES — MARBLE MAKING.

A very different business was that of the old Sonnebergers from that of the modern people. Toys were not purchased in such quantities in those days; people were neither so cultivated nor so rich, and doubtless the children had to be satisfied with the simplest and rudest things. But the Sonnebergers had also other business to attend to. They supplied the armies of Europe with flints; they manufactured and sold whetstones, slates and slate pencils; they began to manufacture marbles, and glass and iron manufactories were established in the beautiful wooded valleys. Salzburg Protestant exiles first introduced the manufacture of marbles into Thuringia. They are made in the same way now as then, and form a large article of Sonneberg export. You may find half a dozen marble mills in the valley leading from Sonneburg to Judenbach. Children and grown up persons first break the hard limestones into small square pieces, which are afterward ground round in marble mills Besides marbles of stone, are those made of glass, porcelain and other materials.

A CHILD'S PARADISE.

Sonneburg exports very different articles now from what it formerly did. Perhaps no better idea can be given of the character of the Sonneberg industries than by visiting one of the great show-rooms of the place, either that of Messrs. Flieschmann or of Otto & Cuno Dressel. These show-rooms are something wonderful in their way, being, in fact, international expositions of children's toys, in at least fifteen thousand varieties. They are paradises where children would go into ecstacies over the wonderful and beautiful things exhibited. There are toy men of all races, zones and ages, from the little Savoyard up to Prince Bismarck and Kaiser William of Germany, in wood, porcelain, papier-mache and terra cotta. There are Russians and Poles, Germans and French, tourist Englishmen and Brahmin priests, living far more peaceably together on the long shelves than they generally do in the big world. There sits an old grandmamma in her easy chair, and next to her Moses lies as comfortably as possible in the bulrushes; there are pretty winged angels alongside of exaggerated Frenchmen and Alpine hunters; there is Britannia trying to rule the waves, and Germania watching the Rhine, and close by a small bust of Horace Greeley, finely executed in terra cotta.

Then there are figures of dogs and monkeys, drummer boys and jumping jacks, clowns, little ladies at miniature pianos, playing a Strauss waltz or "God save the Queen;" boys on wooden horses, peasants from Thuringia and Bavaria, the Marquis of Lorne and his princess wife, jugglers and mountebanks, and "maidens, all forlorn, a-milking the cow with a crumpled horn," all in various materials, and all very beautifully executed.

MENAGERIES — THE BEAUTIFUL DOLL BABY.

There are a thousand other things that attract one's attention. Some are exceedingly quaint. There are long rows of good old Santa Clauses, warmly clad in fur and covered with hoar frost, ready to go out at Christmas time with their sacks filled with toys and dolls and sweets. There are the mangers of Bethlehem, with little wooden figures of wise men, and shepherds, and sheep, and the little infant Jesus in the manger, in dangerous proximity to the cows. Chicken groups of the quaintest character — two have just escaped from the shell, and stare at each other with mutual admiration and surprise. There are cats that squall, dogs that bark and horses that whinny, and cows that give milk, provided it be previously supplied through a hole in the back; elephants with trunks that suck up water and spirt it out again in a very natural manner, and birds that sit in delightfully green trees and chirp away until they get short of breath. In short, there is everything that a child ever heard of or could wish for. There are the many toy musical instruments which boys generally delight to torment older people with — flutes and fiddles, fifes and trumpets, drums and tiny pianos; and again needle-guns, swords, pistols and cannon enough to supply the German army, Landsturm and all. And dolls! They are there by the thousand, of all sizes and prices, plebeian and noble, some of wood, some of porcelain, some of papier-mache, some of wax, some lying a hundred in a row, others beautifully dressed in silks and furs and bonnets, and sleeping quietly in their doll beds or in beautifully padded drawers, some sleep-

ing with their eyes closed and some with them open, and some capable of crying for mamma or papa when occasion requires it.

HOW THE DOLLS ARE BORN.

A visit to a Sonneberg doll manufactory is an exceedingly pleasant and surprising affair. In one manufactory eighty persons are employed, besides 150 others who do work at their own homes. One manager has on his trade list 695 sorts of dolls, each sort having six varieties, so we come to the fact of the existence of over 5,000 varieties of dolls. There are wooden dolls, pot-faced dolls, papier-mache dolls, wax dolls, in the making of which are engaged not only the modelers, wax varnishers, etc., but hundreds of childreu and girls to make boots and dresses, to curl the hair, and other important operations on these fearfully and wonderfully made creatures. The dolls with the wooden heads and wooden limbs and porcelain heads are the lowest germs of the Sonneberg doll. The heads are imported, but the movable limbs and bodies are cut, carved and put together by the dwellers of the mountains, many of whom follow other occupations. In Judenbach are whole families, old and young, male and female, engaged in the interesting occupation of making wooden dolls. The smallest children would have some simple operation to do, such as cutting or sawing the wood into the proper length; an older child would be able to cut out the limbs in the rough, the older members would do the finer work and fix all the anatomical parts together. When the children are sent out to guard the cows or the sheep, they take wood with them and a simple knife, and return home at night with quite a stock of legs and arms. The curious Papagenos of the Thuringian forest, the bird-catchers, are likewise armed with a knife and a peculiar little piece of wood affixed in front of them, and carve the limbs or other pieces of toys, when they have set their snares and are yet waiting for their little feathered victims.

THE WAX DOLL MANUFACTURE.

To make a real wax doll or one of papier-mache is quite a long process. First of all the limbs have to be made. The legs, either of pot or cotton, have to be filled out with moss and sawdust, and the same process is gone through with the body and arms, the task being entrusted to a number of young women. The head is more difficult to make. First comes the moulding, from a kind of whity-brown paste, which when hard is almost indestructible. The head is moulded in two halves, the back and the front, and then the two parts are joined together with the same sort of paste. The heads are made by the thousand, of all shapes and sizes, and left for the moment unpolished and sickly looking. Then these frame pasteboard heads are carried to the wax room, where they are passed through some severe ordeals. The papier-mache model heads are dipped in boiling wax, and thus have the appearance of wax dolls. But the genuine article, the real dolls of wax, are made thus:—The boiling wax is poured into a plaster mould; it adheres to the sides as it becomes cold, and when the mould is taken apart there is the beautiful wax head, but simply a shell, and of course very weak. The head is cast complete, and only a small opening is left in the crown of the head. Then a workman takes the wax shell and very carefully lines it throughout with a kind of soft

paste about the thickness of cardboard, which soon hardens and gives the head its strength and durability. After this process the head is placed over a hot furnace, the wax is permitted to melt to a very slight degree, whereupon it is dusted with powder made of potato meal and alabaster, to give it a delicate flesh tint. In another room the head is provided with a pair of eyes, and it is no easy thing for the workman to select two exactly alike.

Sometimes, as the children know, dolls squint, and this proves that the workman who put them in was not very careful in his work. Another very skillful workman then receives the head, and finishes off the front appearance of the eyes, scooping off all the wax and affixing the lids in a charming manner. Then eyelashes have to be affixed, and then the little lady has to be provided with teeth, which are put in by a skillful workman one by one. A still more interesting study is in the hair dressing room of a doll manufactory. All the dolls that come into this room are complete as far as their heads. The hair for these heads is first worked on to a mesh, which fits the dolls heads so nicely that one cannot tell but that it is a natural growth. Then the rough head of hair, with the doll, is sent to the female hair dressers, who are armed with combs and brushes and hot curling tongs, have no small amount of good taste, and would make excellent ladies' maids. The hair is made up in the most beautiful manner, in imitation of the very newest fashions; and then when the doll is thus combed and curled, it is provided with a delicate little chemisette, and placed, with a hundred or more little companions, in a huge basket, and transported either to the great store-rooms or to the doll milliner, who provides it with clothing and costumes fitting it to appear in the great world. This will only give a faint idea of how wax dolls are made. There are many other interesting parts of the process, such as how the baby dolls are made to open and shut their eyes and to cry 'papa' and 'mamma;' but nearly all children have at one time or another looked into these mysteries of doll life, and a description would be superfluous.— *N. Y. Tribune.*

RENOVATING FURS.

Muffs, capes, cuffs and other articles of fur should be beaten smartly with a switch, then brushed with a stiff brush and carefully examined. If there are any moth-eaten parts in them, they should be cut out, and their places supplied with other pieces of fur, which match them in color, neatly sewed in. The lining and stuffing will have to be removed for this purpose. White furs should be rubbed over smartly with a stick of pipe clay, then switched, and afterwards carefully brushed. This operation will make them look clean. To remove grease from furs, they require to be treated thoroughly by a person engaged in the business; still, any person may remove some of the grease from a muff or cape by placing the article on a table, covering the spot with a layer of soapstone dust about an inch deep, laying a sheet of blotting paper upon it, and on the top of that a warm flat iron — not too hot. The heat of the iron softens the grease in the fur, and the soapstone dust then absorbs it. Warm soapstone dust rubbed among furs, then switched out and brushed off, improves their appearance. Soapstone dust can thus be employed for all kinds of fur, and of every color.

POVERTY OF GREAT MEN.

Homer was a beggar; Plautus turned a mill; Terence was a slave; Boethius died in jail; Paul Borghese had fourteen trades, yet starved with them all; Tasso was often distressed for a few shillings; Cervantes died of hunger; Camcens, the writer of the "Lusiad," ended his days in an almshouse; and Vangelas left his body to the surgeons to help pay his debts. In England, Bacon lived a life of meanness and distress; Sir Walter Raleigh died on the scaffold; Spencer died in want; Milton sold his copyright of "Paradise Lost" for £15, and died in obscurity; Dryden lived in poverty and distress; Otway perished of hunger; Lee died in the streets; Steele was in perpetual warfare with the bailiffs; Goldsmith's "Vicar of Wakefield" was sold for a trifle, to save him from the grasp of the law.

A REMARKABLE FACT.

Professor Mitchell, when delivering one of his splendid lectures on astronomy, in Philadelphia, stated that he had met, in St. Louis, a man of great scientific attainments, who, for forty years, had been engaged in Egypt in deciphering the hieroglyphics of the ancients. This gentleman had stated to him (Prof. M.) that he had lately unraveled the inscriptions upon the coffin of a mummy, now in the London Museum, and that in which, by the aid of previous observations, he had discovered the key to all the astronomic knowledge of the Egyptians. The Zodiac, with the exact positions of the planets, was delineated on this coffin, and the date to which they pointed was the atumnal equinox in the year 1722, B. C., or nearly 3,600 years ago. Prof. Mitchell employed his assistants to ascertain the exact positions of heavenly bodies belonging to our solar system on the equinox of that year (1722, B. C.,) and send him a correct diagram of them, without having communicated his object in doing so. In compliance with this the calculations were made; and, to his astonishment, on comparing the result with the statements of his scientific friend already referred to, it was found that, on the 7th day of October, 1722, B. C., the moon and planets had occupied the *exact* points in the heavens marked upon the coffin in the London Museum.

THREAD-MAKING.

The British manufacturers of thread greatly prefer, for staple, the cotton known as the long fibre, or Sea Island, and the choicest varieties are always made from that description of stock, whenever it can be procured for the purpose.

In the manufacturing process, the cotton is first passed through a picker, which separates it and passes it out in a downy sheet, and rolls it up in a snow-like bundle. It next goes through another separating and refining process, in the carding machine, leaving the latter in the form of a continuous untwisted rope, coiling itself round and round into a circular tin can placed to receive it. From thence it is taken to a comber—a most ingenious apparatus—the peculiar duty of which is to select or separate the long fibres and reject the short ones.

From the comber it is passed through other machinery or processes of uniting, drawing, reducing and partly hoisting, necessary to its pre-

paration for the spinning frames, upon which it is finally adapted and placed. These spinning frames are self-acting, drawing out the fibres and spinning them into a very fine thread, or cord, six of which are twisted together to make the thread, and wind it, when spun sufficiently, upon small bobbins or cops. When these bobbins are full, they are taken to a winding machine, and two of those minute threads are wound together upon a larger bobbin; when full, these are taken to a twisting machine, the two threads drawn off and twisted tightly together, and again wound upon cops or small bobbins.

This is the first process of twisting, and the second is similar to it, except that three of the twisted threads are wound off and again twisted together, thus making the six cords required to give that strength peculiar to the best article.

The thread thus made is reeled off and tied into hanks or bunches, and taken to the bleachery, where it passes through the several different processes of boiling, bleaching, washing, soaping, blueing and drying.

SPEED OF LIGHT AND RAILWAYS.

A railway train, at a continuous speed of forty miles an hour, would pass from the earth to the moon in a little more than eight months; to the planet Venus, in seventy-one and a half years; and would reach the sun in two hundred and sixty odd years. A ray of light will pass from the moon to the earth in a trifle over a single second; from Venus to the earth in a little more than two minutes; from the sun in about eight minutes. So vast are the distances that separate us from these heavenly bodies, and so swiftly does light move!

THE BOY ASTRONOMER.

The first transit of Venus ever seen by a human eye was predicted by a boy, and was observed by that boy just as he reached the age of manhood. His name was Jeremiah Horrox.

He lived in an obscure village near Liverpool, England. He was a lover of books of science, and before he reached the age of eighteen he had mastered the astronomical knowledge of the day. He studied the problems of Kepler, and he made the discovery that the tables of Kepler indicated the near approach of the transit of Venus across the sun's center. This was about the year 1635.

Often on midsummer nights the boy Horrox might have been seen in the fields watching the planet Venus. The desire sprang up within him to see the transit of the beautiful planet across the disc of the sun, for it was a sight that no eyes had ever seen, and one that would tend to solve some of the greatest problems ever presented to the mind of an astronomer. So the boy began to examine the astronomical tables of Kepler, and by their aid endeavored to demonstrate at what time the next transit would occur. He found an error in the tables, and then he, being the first of all astronomers to make the precise calculation, discovered the exact date when the next transit would take place.

He told his secret to one intimate friend, a boy, who like himself loved science. The young astronomer then awaited the event which he had predicted for a number of years, never seeing the loved planet in the shaded evening sky without dreaming of the day when the transit should fulfill the beautiful vision he carried constantly in his mind.

The memorable year came at last—

1639. The predicted day of the transit came, too, at the end of the year. It was Sunday. It found Horrox, the astronomer, now just past twenty years of age, intently watching a sheet of paper in a private room on which lay the sun's reflected image. Over this reflection of the sun's disc on the paper, he expected momentarily to see the planet pass like a moving spot or shadow.

Suddenly the church bells rang. He was a very religious youth and was accustomed to heed the church bells as a call from heaven. The paper was still spotless; no shadow broke the outer edge of the sun's luminous circle.

Still the church-bells rang. Should he go? A cloud might hide the sun before his return, and the expected disclosure be lost for a century.

But Horrox said to himself:

"I must not neglect the worship of the Creator to see the wonderful things the Creator has made."

But he left the reflected image of the sun on the paper, and went into the sanctuary.

When he returned from the service, he hurried to the room. The sun was still shining, and there, like a shadow on the bright circle of the paper, was the image of the planet Venus! It crept slowly along the bright center, like the finger of the Invisible. Then the boy astronomer knew that the great problems of astronomy were correct, and the thought filled his pure heart with religious joy.

Horrox died at the age of twenty-two. Nearly one hundred and thirty years afterward, Venus was again seen crossing the sun. The whole astronomical world was then interested in the event, and expeditions of observation were fitted out by the principal European governments.

GERMAN KITCHENS.

The kitchen is a small bare room, with a brick or concrete floor; no oil-cloth, no cocoanut matting, no carpet, no pretense to comfort. You wonder how all the routine of cookery and scullery can be carried on in it. The copper pans on shelf and peg shine warm and bright from the walls, the window is clean, and buckets full of water, with a large brass water-scoop, show that all is ready for the day's operations. The mere cooking is far more easily accomplished in a German than in an English household. The hot metal plates, provided with numerous circular holes into which rings can be fitted or from which they can be hooked out, to suit the exigencies of the various pots and pans, accommodate any number of kettles or stewpans. These stand, simmering, boiling or stewing, according to their position, and are plunged into the circular holes by which they come nearer to the fire when accelerated speed is desirable. The servant has here again a vast amount of labor saved her; not only that she has no hearth-stoning, fender-polishing, or black-leading to accomplish, but that she can get at all her *plats* readily without burning her face and hands or straining her muscles as with us, by stretching over a wide hearth in front of a scorching fire, to the detriment alike of her clothes, health and temper. I may mention that drunkenness is quite unknown among female servants in Germany, and one cannot help feeling that a great deal has been done for them by this contrivance of the hot metal plates.

Knowing the value of fuel, and the extreme frugality which is observed in all households as to this most expensive item of domestic economy, a Ger-

man servant will give you no trouble in the matter. Having heated water for your early coffee (a mere handful of firing has been necessary for this), she allows the flame to die out. She will draw the few living embers to the mouth of the grating in the hot plate, and lay a piece of peat upon them before she goes out to market. When she returns, a few puffs of breath blow the smoldering heap into life, and her saucepans will soon be boiling in merry concert. The moment dinner is over she will fill every available vessel with water, so that she has a supply sufficiently warm to wash up with, and the fire again dies down. It has to be lighted for supper, but the same frugal rule is observed, and as the hot plate affords no warmth beyond that immediately beneath the saucepans, there is no temptation to make a larger fire; nor do I remember, in a single instance, having had to remonstrate as to waste of fuel.

HOW TO SPELL.

Often in writing, a simple word is required of the orthography of which the writer is not sure. The dictionary may be referred to, but is not always convenient. An easy mode is to write the word on a bit of waste paper, in the two or three ways of which you are in doubt. Nine times in ten the mode which looks right *is* right. Spelling — particularly English spelling — is so completely a work of the eye, that the eye alone should be trusted. There is no reason why "receive" and "believe" should be spelt differently and yet sounded alike in their second syllables. Yet write them "recieve" and "beleive," and the eye shows you the mistake at once. The best way for young people, and indeed people of any age, to learn to spell is to practice writing. Cobbett, the famous English radical, taught his children grammar by requiring that they should copy their lessons two or three times. These lessons he himself gave them in the form of letters; and his French and English grammars are two of the most amusing books in the English language. Of course "learning to spell" came in incidentally.

HOW TO BURN COAL.

A very common mistake is made and much fuel wasted in the manner of replenishing coal fires, both in furnaces and grates. They should be fed with a little coal at a time, and often; but servants, to save time and trouble, put on a great deal at once, the first result being that almost all the heat is absorbed by the newly put on coal, which does not give out heat until it has itself become red hot. Hence, for awhile, the room is cold, but when it becomes fairly aglow, the heat is insufferable. The time to replenish a coal fire is as soon as the coals begin to show ashes on their surface; then put on merely enough to show a layer of black coal covering the red. This will soon kindle, and as there is not much of it, an excess of heat will not be given out. Many almost put out the fire by stirring the grate as soon as fresh coal is put on, thus leaving all the heat in the ashes when it should be sent to the new supply of coal. The time to stir the fire is just when the new coal laid on is pretty well kindled. This method of managing a coal fire is troublesome, but it saves fuel, gives a more uniform heat, and prevents the discomfort of alternations of heat and cold above referred to.

WONDERS OF A MICROSCOPE.

Any of our readers can test for themselves the curious revelations of a microscope by the purchase even of a cheap instrument. It will well repay the expense incurred. Here is a list of some of the wonders seen through a microscope: Insects of various kinds can be seen in the cavities of a grain of sand. Mould is a forest of beautiful trees, with the branches, leaves, flowers, and fruits. Butterflies are fully feathered. Hairs are hollow tubes. The surface of our body is covered with scales like fish. A single grain of sand would cover one hundred and fifty of these scales, and yet a single scale covers five hundred pores. Through these narrow openings the sweat forces itself out like water through a sieve. The mites make five hundred steps a second. Each drop of stagnant water contains a world of animated beings swimming with as much liberty as whales in the sea. Each leaf has a colony of insects grazing on it, like oxen on a meadow. A speck of potato-rot the size of a pin-head contains about two hundred ferocious little animals, biting and clawing each other savagely.

SIMPLE REMEDIES FOR ACCIDENTS.

Professor Wilder gives these short rules for action in case of accident: For dust in the eyes, avoid rubbing and dash water into them; remove cinders, etc., with the round end of a lead pencil. Remove insects from the ear by tepid water; never put a hard instrument into the ear. If an artery is cut, compress above the wound; if a vein is cut, compress below. If choked, get upon all fours and cough. For light burns, dip the part in cold water; if the skin is destroyed, cover with varnish. Smother a fire with carpets, etc.; water will often spread burning oil, and increase the danger. Before passing through smoke, take a full breath, and then stoop low; but if carbon is suspected, then walk erect. Suck poisoned wounds, unless your mouth is sore. Enlarge the wound, or better, cut out the part without delay. Hold the wounded part as long as can be borne to a hot coal or end of a cigar. In case of poisoning excite vomiting by tickling the throat, or by hot water or mustard. For acid poisons, give alkalies; in case of opium poisoning, give strong coffee and keep moving. If you fall into water, float on the back, with nose and mouth projecting. For apoplexy, raise the head and body; for fainting, lay the person flat.

FIRST USE OF THE HANDKERCHIEF.

Until the reign of the Empress Josephine a handkerchief was thought in France so shocking an object that a lady would never have dared to use it before any one. The word, even, was carefully avoided in refined conversation. An actor who would have used a handkerchief on the stage, even in the most tearful moments of the play, would have been unmercifully hissed; and it was only in the beginning of the present century that a celebrated actress, Mlle. Duchesnoise, dared to appear with a handkerchief in her hand. Having to speak of this handkerchief in the course of the piece, she never could summon enough courage to call it by its true name, but referred to it as a light tissue. A few years later a translation of one of Shakespeare's plays, by Alfred de Vigny, having been acted, the word handkerchief was used for the first time on the stage.

amid cries of indignation from a great part of the house. I doubt if, even to-day, French *elegantes* would carry handkerchiefs if the wife of Napoleon I. had not given the signal for adopting them. The Empress Josephine, although really lovely, had ugly teeth. To conceal them she was in the habit of carrying very small handkerchiefs, adorned with costly laces, which she continually raised to her lips. Of course all the ladies of the court followed her example, and the handkerchief rapidly became an important and costly part of the feminine toilet; so much so that the price of a single handkerchief of the *trousseau* of the Duchess of Edinburgh would make the fortune of a necessitous family.

HOW TO MAKE SACHETS OR SCENT-BAGS.

Various powders, etc., placed in silk bags or ornamental envelopes are agreeable to smell of, and also economical for imparting a pleasant odor to linen and clothes as they are packed away in drawers, for they prevent moths.

For heliotrope powder, take half a pound of orris root, one quarter of a pound of ground rose leaves, two ounces powdered tonquin bean, one ounce vanilla bean, one-half drachm grain musk, two drops otto of almonds; mix it all by sifting through a coarse sieve. This is one of the best sachets ever made, and perfumes table-cloths, sheets, pillow-cases and towels deliciously.

For lavender powder, take one pound of powdered lavender, one-quarter of a pound of gum benzoin, and one-quarter of an ounce of otto of lavender.

For patchouli, use one-half a pound of patchouli ground fine, and a very little of otto patchouli. This herb is often sold in its natural state as imported, and is tied up in half-pound bundles.

Sandal wood satchet powder is good, and consists of the wood ground fine. Cedar wood, when ground, forms a body for other powders, and will keep moths at a distance. Dried fennel, when ground, is also used for scent bags, and ground nutmeg is liked for this purpose.

ANCIENT BILLS OF LADING.

Some papers of Sir William Pepperill, who, in ante-revolutionary times, resided at Kittery, Maine, have recently come into possession of a resident of Newburyport, and the *Herald* of that place copies a bill of lading dated June, 1726: "Shipped by the grace of God in good order and well condition, by Wm pepperills on their own acct. and risque, in and upon the good Briga, called the William, whereof is master under God for this present voyage George King, and now riding at anchor in the river Piscataqua and by God's grace bound to Barbadoes," and then follows the freight, lumber, shingles, oak staves, timber, fish, yokes and bows, winding up, "and so God send the good Briga to her desired port in safety. Amen." Accompanying this bill of lading is a letter of orders to Capt. King as to how he is to proceed and to deliver the freight to Thomas Harper, esq., merchant of Barbadoes. The spelling is rather uncertain: in the indenture it is "marchant," and in the letter "merchant." There is also another letter to Capt. Foxall Curtice, dated Aug. 13th, 1717, master of the brig William and Jane, going to New-

foundland, where he is to buy French brandy and claret wine. The captain is to be secret about it, although there was no prohibitory liquor law at that time.

MUSK.

Musk is a secretion, and is obtained from the musk-deer (*Moschus moschiferus*), a pretty little animal inhabiting the higher mountain ranges in China, Tonquin and Thibet. The musk is found in a small pocket or pouch under the belly of the deer. The hunters cut off this pouch, which, becoming dry, preserves its contents, and in this state the best article reaches our markets. Musk when moderately dry, is an unctuous powder of reddish brown color. It gives out a powerful odor of a warm, aromatic character and most wonderful persistency. Blending well with almost every other scent, it discovers but little of its own peculiarity in compounds when used in proportion, and yet gives them great permanency. In point of general usefulness to the perfumer, it is probably unequaled by any other substance; for, although coarse and undesirable in a pure state, the most popular compounds are those in which it is an ingredient. Genuine musk is very costly, being worth, when separated from its sac and all extraneous matter, from twenty-five to thirty-five dollars the ounce. Its great strength compensates in a measure for its price. One part of musk, it is said, will scent more than three thousand parts of inodorous powder.

POST-OFFICES were first established in France in 1464; in England, 1581; in Germany, 1641.

A MANTELPIECE ORNAMENT.

A pretty mantelpiece ornament may be obtained by suspending an acorn, by a piece of thread tied around it, within half an inch of the surface of some water contained in a vase, tumbler or saucer, and allowing it to be undisturbed for several weeks. It will soon burst open, and small roots will seek the water; a straight and tapering stem, with beautiful, glossy green leaves will shoot upward and present a very pleasing appearance. Chestnut-trees may be grown in the same manner, but their leaves are not so beautiful as those of the oak. The water should be changed once a month, taking care to supply water of the same warmth. Bits of charcoal added to it will prevent the water from souring. If the little leaves turn yellow, add one drop of ammonia into the utensil which holds the water, and they will renew their luxuriance. Another pretty ornament is made by wetting a sponge and sprinkling it with canary, hemp, grass, or other seeds. The sponge should be refreshed with water daily, so as to be kept moist. In a few days the seeds will germinate, and the sponge will soon be covered with a mass of green foliage.

STAGES.

The first stage coach in America started from Boston from the site of No. 90 North street, in 1661. The first line of stage coaches between Boston and New York was established in 1732, a coach leaving each city once a month; fourteen days were required to complete the journey. In 1802 the mail stage started from Boston for New York on Monday morning at eight o'clock, and was due in New York at noon on Friday.

MODERN SILVER WARE.

It was but a little before the American Revolution (about 1760) that silver table-spoons began to exclude those of wood, horn and pewter, from the tables of the quality in England, and even teaspoons of silver are said to have been rare before the time of Queen Anne (1691 to 1713). To this day, if we are rightly informed, no spoons of solid silver, large or small, much less silver forks, are to be found in common use among the "plain people" (with rare exceptions) of any European country. In the United States, on the contrary, it is unnecessary to inform the American readers of to-day that, as a rule, the farmer is but thriftless and the mechanic but a journeyman, whose spoons and perhaps forks are not of solid silver. The journeyman furnishes his table with plated articles of this class, or at worst brittania, and only the rude day-laborer contents himself with tinned or pewter ware. Plated tea-services, castors, salvers, pitchers, ladles, cake and fruit baskets, etc., are too common to be noticed, unless wanting, on the tables of those in easy circumstances, and it is no rare distinction if they are of solid silver. In fact, for bridal gifts nothing less than solid silver is thought respectable, and in this way, so universal has the custom of bridal gifts become, hardly any comfortable young couple now begin housekeeping without a fair show of genuine table silver, as far at least as spoons, forks, butter, fruit, pie and fish-knives, napkin rings, and such trifles.

The beauty of the ordinary American table, with its showy damask and china, sparkling cut glass and lustrous utensils of silver, all disposed in the tasteful symmetry native to the American housewife, is a power, and one that goes too near the springs of moral as well as æsthetic culture to be lightly esteemed by the most serious observer. The development of this crowning symbol of domestic refinement is worthy our attention. A critical journal has remarked that an American lady's idea of a dinner is a handsome service of silver and china, with two or three vases of choice hot-house flowers. We suppose it was a typical American lady, among the "plain people," too, who stated to us the elements of a meal, as she understood it, in the following series: First, order, (including elegance and good attendance); second, intellectual conversation; and, lastly, something to eat.

Plated ware originated in England about the middle of the last century, the first application having been made to small articles in 1742, by Thomas Bolsover, a Sheffield mechanic. The new elegance brought within the means and the supposed proprieties of the middle class, took the name of "Sheffield Plate," not from the process of plating, but from the silver ware of which it was an imitation. Plate, in this sense, is not our Saxon word cognate with *flat*, but was borrowed from the Spanish *plata* (silver), and applied to all utensils made of the precious metals, in whatever form.

To our elderly readers "Sheffield Plate" will still have a familiar sound, for under this name the beauty of silver was first popularized in America, and to a far greater extent than even in England. Probably the Sheffield and Birmingham manufacturers of plated ware at one period exported more goods to this country than they sold at home.

A further and greater advance was

made in 1838, by the invention of electroplating, or rather, the practical application of the method which had been known, but strangely neglected, for thirty years. At one stroke, plating was greatly reduced in cost, its applications indefinitely extended, and its effects incomparably improved. Everybody in America is now familiar with the ordinary wares of our numerous electroplating companies, and there is hardly a cottage worth two hundred dollars in the country where such wares are not found; although the rich plating of the Elkintons, in England, and the Gorhams in America, is too high in first cost for the strictly popular demand.

Within half a century, the business of the American silversmith was mostly confined to making spoons to order for the jewelers, who rarely purchased more than one or two dozen at a time, for particular orders. About 1825 it was noticed that the silversmiths began to venture into the manufacture of light spoons for general sale through a class of cheap jewelry peddlers, who are still well remembered by natives of New England of that period. The Province manufacture had begun to be extended and brought into national relations by the enterprise of a young goldsmith named Jabez Gorham, who adapted his work to the general requirements of the trade, and made his way with it into the Boston market by underselling and outpushing the unmercantile mechanics of his craft. The droll account the old gentleman, who died only a few years ago, used to give of his semi-annual marketings in Boston, is more expressive than a general description could be, and of the very modest status of the now imposing silver trade of our chief cities: how the Boston jewelers assembled at his lodgings, pursuant to notice, that they might be all admitted at the same moment, without partiality to view and divide the little trunkful of new jewelry spread out upon the bed.

DIFFERENT KINDS OF EYES.

No branch of science has been more thoroughly mastered than optics. The principle of vision must be essentially the same in all eyes, but they differ remarkably according to the needs of the animals. Birds of lofty flight, as the condor, eagles, vultures, and carrion-seeking prowlers of the feathered race, have telescopic visions, and thus they are enabled to look down and discover their unsuspecting victims. As they approach noiselessly from above, the axis of vision changes — shortening, so that they can see as distinctly within one foot from the ground as when at an elevation of one mile in the air

This fact explains the balancing of a fish-hawk on its pinions half a mile above a still pond, watching for fish. When one is selected, down the savage hunter plunges, the focal axis varying always to the square view of its intended prey. As they ascend, the axis is elongated by a curious muscular arrangement, so as to see so far off again.

Snails have their keen eyes at the extremity of flexible horns, which they can protrude or draw in at pleasure. By winding the instrument round the edge of a leaf or stalk they can see how matters stand on the opposite side.

The hammer-headed shark has its wicked-looking eyes nearly two feet apart. By one effort they can bend the thin edges of the head, on which the organs are located, so as to examine the two sides of an object the size of a full-sized codfish.

Flies have immovable eyes. They stand out from the head like half an apple, exceedingly prominent. Instead of smooth hemispheres they have an immense number of facets, resembling old-fashioned glass watch seals, each one reflecting the light directly to the optic retina. That explains why they cannot be approached in any direction without seeing what is coming.

REAPERS AND MOWERS.

Reapers are not as modern an invention as many would suppose. The first account of a machine to reap grain appears to be that described by Pliny, (A. D. 23). He says in the extensive fields of the provinces of Gaul, a large hollow frame, with projecting teeth on the edge and supported on two wheels, is driven through the standing grain by an ox yoked behind it. In this manner the ears are torn off and fall into the frame. Pallachus, an Eastern prelate, wrote in the fourth century, A. D., giving a description of a contrivance which was similar to our leading machines. He says they have a row of sharp teeth at the front edge, between which the straw passed, the heads or ears are caught by the teeth and fall into the cart, the broken stalks being left behind.

One of the first modern machines which resembled the old Gallic implement, where the heads were stripped from the straw, was invented in England by William Pitt, in 1786. The first patent for a reaping machine, in England, was obtained by Joseph Boyce, July 4th, 1799. Henry Ogle, a school-master of Remington in 1822, seems to be the first who invented and used the reciprocating cutter. Up to this time, it was almost universal to hitch the horses behind the implement. This machine was very simple, and it was estimated it would cut fourteen acres per day with ease. The working people at that time threatened to kill the maker, if he persevered any further in trying to bring it into use.

In 1826, the Rev. Patrick Bell, of Scotland, invented an apparatus for reaping grain, which is the oldest known machine in use. It cut a swarth of five feet with the power of a single horse, about an acre an hour. This machine was on exhibition at the World's Fair of 1851, in London. One of the first patents granted in America, was to Richard French and J. T. Hawkins, of New Jersey, on May 17, 1803. Obed Hussey's machine was patented in 1833, and contained nearly all the main features of those used at the present time. His machine was intended to cut both grain and grass, and had a reciprocating knife and a slotted guard finger, both of which are now used in all harvesters. McCormick, of Virginia, patented his reaper in 1845 and 1847, and received a medal at the Worlds' Fair, in 1851. Both Hussey and McCormick changed their machines by substituting one wheel for the two wheels previously used. Soon after the two-wheeled machines came into use, having the hinged finger-bar, including the Buckeye and Cayuga Chief. In 1855, at a competitive trial, about 40 miles from Paris, the American machine cut an acre in 22 minutes, the English in 66 minutes, and the Algerian in 72 minutes. Among the most prominent machines manufactured, may be mentioned the Buckeye, Champion and Excelsior machines, the most of which are constructed with the view of being durable and possessing all of the latest improvements that the combined skill and capital which the manufacturers have at their command.

SPECIFIC GRAVITY.

This is a scientific term, meaning the weight of a body compared with that of any given standard. For all solids and liquids, water is the standard. This plan was invented by Archimedes, the famous Greek mathematician. Hydrometers, for ascertaining gravities, have been in use for nearly fifteen hundred years. A marked improvement was made on this instrument in the year 1100, by Alhazen, a Saracen. Albu-r-Raihan, another Saracen, had made the first table of specific gravities a hundred years before. Another table was made in the seventeenth century, by Athanasius Kircher. This was the first table of the kind used in Europe.

TAPIOCA.

Many persons are familiar with this as an article of diet who do not know how it is obtained, or really what it is. It is the product of the cassava root. There are two varieties of the cassava plant, both natives of South America; the one is the bitter, and the other the sweet cassava, but both are used for food. The first, in its natural state, is highly poisonous, and the Indians use its juice for poisoning their arrows. It is from this cassava that *tapioca* is made, but with all the poison removed. The poisonous principle has been found to be very volatile, hence, by submitting the roots to the action of heat, it is all driven off; it is only when eaten raw that it is highly dangerous. The roots are first washed, then reduced to a pulp, and the juice allowed to drain out. The pulp is then heated in a pan until it becomes slightly roasted; when in this state it forms cassava bread, the principal food of the natives. The juice which has been allowed to filter from the pulp is of a milky color, and is allowed to settle for some time in wooden dishes. A deposit of starch then falls to the bottom; the poisonous juice is now run off, the starch washed and all the moisture driven off by putting it on hot plates until it is dry. It is afterward granulated in sieves, and in that state forms the *tapioca* of which very excellent puddings are made. The heating of this starch on the hot plates drives off all the poison.

Recent experiments have been made in France by distilling the cassava root and condensing the vapors, for the purpose of ascertaining the nature of its poisonous properties. A very small quantity of prussic acid was thus obtained, about 0.004 per cent. of the vapor, but the roots employed in the experiment were not fresh, hence it is reasonable to suppose that they contain more of this volatile poison when fresh dug from the ground, as cows have instantly dropped down dead from eating them. No other poisonous substance was found. Cassava contains a great amount of starch, no less than 23 per cent., and 5 per cent. of sugary matter.

HISTORY OF SLATE PENCILS.

Thirty years ago all the slate pencils used were manufactured in Germany. She then supplied America with this commodity. In 1850, there was a young man living in West Rutland, Vt., eighteen years of age, who fortunately discovered a supply of stone for making a first-class article of slate pencils. He began by whittling out the pencils and selling them to school children. Being a better article than

that for sale in the stores, he found a ready sale for all he could whittle out.

He argued that if they would sell thus readily at home, they would sell readily everywhere. He became possessed of the idea that there was a fortune in the business, and his dream has been realized. This quarry of slate pencil stone was situated in a large ravine, four miles north of Castleton, Vt., near Bomoseen Lake. The land on which it was situated was for sale at one hundred dollars. He purchased it, and began operations by sawing out the pencils and whittling them round.

The business of making them grew immensely on his hands so that it was impossible to keep a clean order book.

Machinery was invented to facilitate the process, which has reached something like perfection, and enormously increased the production of pencils. At present the quarry and mills are owned by a joint stock company. They are valued at three hundred thousand dollars. From fifty to one hundred thousand pencils are turned out daily, and upward of a hundred hands are employed in the quarry and in the mill.

After the stone is quarried it passes through four processes before it is made into pencils. It is sawed into rectangular blocks five inches by seven, and split by hand into slabs of the same length and breadth, which are carefully assorted. These slabs pass through a machine which shaves them all to the uniform thickness of a quarter of an inch, when they are ready for the final process.

The machinery for reducing these slabs to pencils, consists of iron plates fitted to receive them, fastened to an endless chain which passes over rollers at either end.

These plates, of which there are about twenty on a chain, each receive a slab, and as it passes from one roller to the other, the pencils are cut and rounded out half way to completion by semi-circular knives, a dozen different sets of knives being firmly fastened above them.

The slabs are then turned over and passed back through another machine exactly similar, and a perfect pencil is the product.

They are counted out by children and packed one hundred in a box. The pencils are sold by the manufacturers at half a cent a piece or fifty cents a box, or ten times the cost of pencils in Germany, where one thousand can be bought for less than fifty cents. Being made from a superior article of stone they are used throughout the United States in preference to those imported from Germany.

The slate pencil business, like the pin business, is a small one in itself, but becomes large where it is necessary to supply all the school children of America with pencils. Thirty years ago the whole idea of it was in the brain of a young Yankee boy. To-day it is a business involving over a quarter of a million of money. It has been and will continue to be a profitable business, as this is the only quarry and slate pencil mill in the United States.

Besides manufacturing the pencils the firm have a mill for grinding the stone to flour, bolting it finer than fine flour, to be used in the process of manufacturing paper, especially wall paper. This flour sells for twenty dollars a ton. The stone from which the pencils are made contains upwards of thirty per cent. of alumina, from five to eight per cent. more than the stone from which slate pencils are manufactured in Scotland.

PAPER---ITS MATERIAL AND USES.

From the best authorities, it would appear that cotton was the first material used in the manufacture of paper, after papyrus. The exact date is not known, but it is pretty well authenticated that paper from this material was made and used in the eleventh century. The Chinese, since the decadence of the papyrus manufacture in Alexandria, Egypt, may be considered the greatest manufacturers and users of paper. With them this material occupies a place of importance not equalled by any other one substance in use by us. They employ it for clothing, building, decorations, toys, and a hundred other necessities. They utilize linen rags, the inner bark of trees, the fibres of cane and bamboo, and for "rice paper" the stems of a wild leguminous plant. The soles of boots, umbrellas, hats, garments resembling in texture and durability woven fabrics, kitchen and table utensils, boxes, bowls, etc., this ingenious people fashion from paper. Even their pocket handkerchiefs are made of it; and some specimens of their paper are scarcely inferior in toughness and elasticity to the best textile fabrics.

We have scarcely reached their aptness in the quality of the paper, and are far behind them in adapting the material to our every day needs. We make paper water-pipes, row boats, paper hats, and bonnets, paper collars, cuffs, and shirt-fronts. We use it for twine to tie up paper packages; a specimen for machine belting is now on our table. It is doubtful if any other material is susceptible of a greater diversity of uses; yet we seem to lack the means of producing it cheaply enough to supersede other and more costly substances. It is hardly to be believed that knowledge of the manufacture, the various processes to adopt it to manifold uses, is lacking, but rather the difficulty of procuring the material from which it is made prevents us from making a more extended use of it.

For some years past paper "stock" has been very dear. Rags advanced in price, as cotton went up. Wood fibres and straw have been tested with a view of keeping down the continually increasing price of rags and furnishing a cheaper and equally valuable material. Yet these, especially the latter, are not new attempts. So long ago as 1756 the Germans used straw, and in 1775 a book was printed in France the paper of which was made of linden or basswood. In 1800 good white paper was made in England from straw and wood. It is certain that neither straw nor wood have yet been found equal to cotton and linen as a material for the production of paper.

HISTORY AND NATURE OF ALCOHOL.

The intoxicating quality of wine was known in the time of the patriarchs; but, although the early Egyptians were acquainted with fermented barley wort, it is only within the history of the present generation that the properties of the active principle in the wine and wort have been clearly ascertained.

The alchemists of Arabia invented the still, and it appears that one Abucasis was the first person who separated the crude spirit by distillation from wine. He it was who gave it the name of "alcohol," the meaning of which is to paint. This term was probably used because spirit will dissolve certain colors and resins and render them fluid, which water will not.

Raymond Lully, a chemist of the thirteenth century, found that alcohol, produced by the ordinary process, contained one-half water, and he has the credit of being the real discoverer of spirits of wine. Still, Lowitz, a German chemist of our day, was the first to prepare real alcohol. Alcohol is so cohesive with water that it is only with the greatest chemical skill that the least portion of water combined with it can be separated.

There are only two methods of forming this extraordinary body: the one by fermentation of saccharine fluids, which has been known from time immemorial; the other (a recent discovery) by forcing olefiant gas through sulphuric acid. It was Hannel who made the last discovery; and, although nothing of importance has yet resulted from it, yet we may confidently look forward to great advantages. Hannel, and more recently Berthelot, have shown that alcohol can be produced from coal. By the fermentation process it is known that alcohol is derived from starch, being converted first into sugar, then into glucose, then into alcohol. The Mahommedans, Hindoos and Chinese, all abstain from alcohol on religious principles.

Alcohol is a transparent fluid. It has never been congealed or rendered solid by cold. It is considerably lighter than water, as about 79 is to 100. It burns with almost colorless flames, and leaves no trace of residue. Alcohol, when free from water, will boil at a temperature equal to a hot day in Summer—80 degrees Fahr. It expands immensely with little heat, hence it is used in the thermometer to measure the increase and decrease of heat. Alcohol dissolves resin, attars, ethers, alkaloids, and numerous other bodies; hence it is of immense service in the arts and manufactures. Many trades would cease without alcohol, it being an essential ingredient in many things; we therefore could not dispense with it.

TASTE AND SMELL UTILIZED.

The two senses of tasting and smelling are usually considered mainly as servants, capable of contributing to our luxurious pleasures, rather than as aids to business success; yet some departments of business could hardly be conducted without their employment. The sale and purchase of liquors and wines are consummated almost entirely by the help of taste and smell. Although the strength may be judged by the size and appearance of bubbles formed when shaken, by the sinking or floating of olive oil in them, and their appearance when turned, yet the expert judges more readily and correctly of their strength, as well as purity, flavor, etc., by tasting and smelling. In the great wine marts of Europe, the business of wine taster is a distinct profession. Tobacco and hops are judged by the purchaser fully as much by smell as by sight and touch; and it is wonderful what expertness is attained by professional judges by the cultivation of this sense; their judgment being practically infallible.

But the testing of the tea exhibits, in a more marked manner, the use of taste and smell in mercantile transactions. In every wholesale tea house will be found a row of tea-cups with a little furnace or lamp for heating water. There is no sugar or milk. In the side of every chest of tea, ranged in tiers along the walls, is a small hole stopped by a cork. The taster draws

the cork, takes a few grains of tea in his hand, smells it, then puts it in a cup, pours a little hot water on it, tastes, and his judgment is formed, the character of the tea is fixed. Frequently the smelling is sufficient, and decidedly the professional taster declares the character of the article he has tasted. Not less remarkable is the fact that there is seldom any marked disagreement between the estimates made by different individuals. The profession of tea taster in our large cities is quite lucrative. Merchants purchase largely, relying implicitly on the representations of the expert; and it is seldom their confidence is misplaced, whatever "tricks of the trade" there may be attempted to deceive the taster.

The gift, if so it may be called, of being a successful tea taster, is not general, although it might be supposed that experience would be all that is necessary to insure perfection, or at least an approximation to it. The profession is severely taxing to the nervous system, affecting the subject similarly to alcohol or tobacco when used to excess.

LIQUID GLUE.

To 1 oz. of borax, in a pint of boiling water, add 2 ozs. of shellac, and boil till the shellac is dissolved. Another — Dissolve 8 ozs. of the best glue in half a pint of water; that being done, add slowly, and keep stirring, 2½ ozs. strong aquafortis. Keep well corked ready for use. Another — A useful glue for fastening papers together only by being wetted by the tongue is made as follows: Dissolve 1 pound of glue or gelatine in water, and add half a pound of brown sugar, and boil them together. Make into cakes by pouring into shapes. It becomes solid when cold.

HOW TO CHECK COUGHS.

Dr. Brown-Sequard, in a late lecture delivered by him in Boston, stated that there are many facts which show that morbid phenomena of respiration can always be stopped by the influence of arrest. Coughing, for instance can be stopped by pressing on the nerves of the lip in the neighborhood of the nose. A pressure there may prevent a cough when it is beginning. It is generally known that sneezing may be stopped by this plan, but it is new to many that it can check coughing. Dr. Brown-Sequard, however, is a great authority, says the *Medical Press and Circular*, and asserts it. He added that pressing in the neighhood of the ear, right in front of the ear, may stop coughing. It is also preventive of hiccough, but much less so than of sneezing or coughing. Pressing very hard on the top of the mouth inside is also a means of stopping coughing; and to show that the will has immense power, he mentioned that there was a French nurse who used to say, "The first patient who coughs here will be deprived of his food to-day." It was exceedingly rare that a patient coughed.

A HINT FOR WOOD-WORKERS.

The usual practice of cabinet-makers and workers in wood generally, in making a glue joint on end wood, is to apply a thin watery solution of glue, which serves the purpose of a sizing, to the surfaces which are to be joined, allowing it to dry before making a final application of the glue. The object of the sizing, which is to prevent the absorption of the glue by the wood, may be as effectually accomplished, in all ordinary cases, by simply rubbing the

joints thoroughly with white chalk before gluing. The chalk not only prevents the glue from being absorbed, but combines with it and forms a sort of cement with good effect upon the firmness of the joint.

Many cabinet-makers will remember an advertisement which was extensively published some years ago, in which an ingenious person in one of the principal eastern cities offered, on receipt of fifty cents to send an infallible recipe "for making glue joints on end wood without sizing." A good many half dollars were harvested by the advertiser, in return for which he sent to each of the writers a slip of paper containing the words above quoted. "Rub the joints well with white chalk." The recipe is a good one, and ought to be worth at least half a dollar, as it applies equally well to end, mitre or side joints.

RULES FOR SHOWING A GARDEN.

There are two rules for taking a party over a garden, which, if violated in one single instance, will do infinite harm in respect to the best effect. The first is, never to take strangers over your garden against the sun. It is worse than throwing dust in their eyes, if there is an eye among them. And the second rule is, to be sure not to let strangers see the best parts of the garden first. Take them to *moderate* first, then let each turn reveal a better scene than the last, and let the last itself be the grand climax. As long as they live, they will never forget the good impression.

COMEDY AND TRAGEDY were first exhibited at Athens five hundred years before Christ.

FACTS FROM THE CENSUS.

Some curious facts come to light upon examining the figures of the late census relating to manufactures. In addition to the conclusions reached as to the relative importance of several principal cities in the aggregate of their productions, we learn which States excel in each separate branch of manufacture, and how large a proportion of the country's total production it supplies. Thus, in the manufacture of cotton goods, Massachusetts takes precedence, turning out about one-third of the aggregate production of all the States. Massachusetts also takes the lead in bleaching, boots and shoes, (producing nearly one-half of all made in the country), baskets, brushes, cordage, cutlery, (over one-half), chairs, spinning and weaving machinery, fish oils, paper, and photography, preserves and sauces, sails, straw goods, wearing apparel, wire and woolen goods.

New York heads the list in the manufacture of artificial limbs, awnings and tents, bellows, leather belting, billiard tables, book-binding, cigars, cheese, paper and packing boxes, brooms, carriages, cider, coffee, coffins, paper collars, confectionery, cooperage, dye-woods, engraving, files, refrigerators, furs, gas, gloves, grease, hair-work, hats and caps, hoopskirts, corsets, wheels, stoves, jewelry, leather, malt liquors, picture frames, malt matches, millinery, tobacco-pipes, pocket-books, printing, pumps, regalia, safes, sugar, tin, copper, and sheet iron ware, tobacco, type, upholstery, varnish, vinegar and wire work.

Pennsylvania claims pre-eminence in the matter of blacking, brass founding, brick, rag carpets, cars, coke, charcoal, chromos, coal oil, drugs, fireworks, stained glass, glassware, glue, iron and

its manufacture, lime, lumber, general machinery, steam boilers, lead and zinc paints, patent medicines, perfumery, roofing materials, saws, steel, stereotyping and electrotyping, umbrellas and canes, whips and turned and carved wood.

Connecticut stands at the head in bells, firearms, gunpowder, hardware, plated ware, spectacles, and one or two other articles which constitute subdivisions of general heads.

New Jersey leads off in artificial building stone, saddlery hardware, japanned ware, kaline and ground earths, trunks, valises and satchels.

Illinois is at the head in butchering and in distilling liquors. It also exceeds in the production of paper bags and packed pork.

Ohio makes the most boats, produces the most dressed flax, and turns out the most wooden ware.

One or two other States are mentioned as pre-eminent in some two or or three articles of minor importance, but the above embrace the leading facts of interest to be gathered from the tables.

HISTORY OF COFFEE.

Coffee was originally known by the name of *Kauhi.* Although the plant or tree is indigenous to Southern Abyssinia, where it is even to the present day cultivated, yet it derived its name from *Kaffa* in Eastern Africa, where the plant also grows wild and very abundantly. The Malays, who from their intercourse with the Arabs, have long known the berry, call it by the Arabian name *Kawah;* the Japanese, however, in common with ourselves, designate it coffee. There is an Eastern legend, which ascribes the discovery of the berry to a Dervish, named Hadji Omer, who, in the year 1285, being driven out of Mocha, was induced in the extremity of hunger, to roast the berries which grew near his hiding place. He ate them as the only means of sustaining life; and steeping the roasted berries in water to quench his thirst, he thus discovered their agreeable qualities, and also that the infusion was nearly equal to solid food. His persecutors, who had intended that he should die of starvation, regarded his preservation as a miracle. According to the manuscript of an Arabian scribe of the ninth century of the Hegira, or the fifteenth of the Christian era, (which manuscript is, or was, in the great library of the city of Paris), we learn that a certain Mufti or High Priest named Gemal Eddin, of Aden, a town of Arabia Felix, was the first who introduced to his countrymen the custom of coffee-drinking. Having returned from Persia, where he had observed the beverage used as a medicine, and being at the time, himself, sick, he tried, as an experiment, a dose of the "black draught."

Finding it both curative and exhilarating, he forthwith turned his discovery to a good account by applying its virtues as an antidote to the torpor and drowsiness of his monks, whom he had often found dormant at their devotions. Coffee, which had been in use in Ethiopia, it is believed from time immemorial, was carried by the Dervishes to Mecca, where the beverage became very popular. It continued its career through Syria, and in 1554 became the favorite drink at Constantinople, where, soon after, coffee houses were opened. From the "City of the Sultan," it passed to Western Europe, but at what precise time historians have not positively determined. It is believed to have been introduced into

Venice about the year 1615. In 1644, it was known at Marseilles, some of the coffee beans having been taken there from Constantinople, with vessels and an apparatus for making the beverage. The traveler Thevenot was among the first to introduce into Paris the custom of taking coffee after dinner. He had but few imitators until ten years after, about 1668, when the coffee parties of the Turkish Embassador at Paris brought the beverage into fashion. Coffee was first regularly introduced into England about the middle of the seventeenth century, as we learn from the following extract from Sir Henry Blount, who visited Turkey in 1634:

"The Turks have a drink," he writes, "called *Cauphe,* made of a berry as big as a small bean, dried in a furnace and beat to a powder of a sooty color, in taste a little bitterish, that they seethe and drink hot as may be endured." Notwithstanding the opposition and prejudice which prevailed against the beverage for nearly a score of years after its introduction, the coffee houses continued to increase in London and other large cities in England. The English and French dispute the honor of introducing coffee into Western Europe. Coffee was not used in Rome until long after it had been known to and tasted by Italian travelers at Constantinople; but the Church, however, looked with favor upon a beverage, one effect of which, was to keep both priests and people awake. The first use of coffee in England, was known in 1657. An animated controversy was kept up about coffee during the sixteenth and seventeenth centuries. In spite of opposition, coffee soon became a favorite drink, and the shops where it was sold, places of general resort.

Coffee, a cinchonaceous genus, consisting of many species of tropical berry-bearing shrubs, one of which, *Coffaea Arabica,* the only one which is cultivated, is a native of Upper Ethiopia and Arabia Felix. This is the parent of the plants from whose crushed berries we derive that aromatic drink called coffee. This albuminous substance — the coffee of commerce — is to that plant what the flour is to corn, the white meat to a cocoanut, and the aromatic substance to the nutmeg. Its flower consists of one funnel-shaped petal with a slender tube. It is described botanically as an ever-green shrub having oval shining sharp-pointed leaves, white, fragrant, five-cleft clustered corollas, with projecting anthers and oblong pulpy berries, which are at first of a bright red color but afterwards become purple. The dark-green leaves shining brilliantly in the sun afford a beautiful contrast to the white jessamine-like blossoms. Its leaves resemble those of the common laurel, although not so dry and thick. From the angle of the leaf-stocks small groups of the white flowers issue. These flowers fade very soon, and are replaced by a kind of fruit not unlike a cherry, which contains a yellow fluid enveloping two small seeds or berries, convex upon one side, flat and furrowed upon the other. These seeds are of a horny nature; they are glued together, each being surrounded with a peculiar covering. The period of flowering does not last more than two days. In a single night the blossoms expand so profusely that the trees appear as if covered with snow. The seeds are known to be ripe when the berries have a dark red color. Travelers tell us that nothing can be conceived more delightful than the appearance and perfume of a coffee plantation in full

bloom. The fruit begins to ripen in February.

It is now an ascertained fact that much of the far-famed Mocha coffee is produced in East India and shipped to Mocha. The excellence of Mocha coffee appears to consist more in the name and method of curing than any other cause. The coffee tree would grow to the height of fifteen or twenty feet, yet it is usually kept down by pruning, to that of five feet, for increasing its productiveness as well as for the convenience of cropping. It begins to yield fruit the third year, but is not generally in full bearing until the fifth. The berries when ripe are picked and spread on drying-grounds and are dried with the pulp and parchment on the bean. When dry the berries are placed under wooden rollers or pounded in wooden mortars, and the outer skin being thus removed, the beans are winnowed, sized and packed for market. It should not be exposed to sun or wind until the parchment cracks, as every hour's exposure to the atmosphere, after that is removed, takes away the color and aroma of the bean. For packing, casks are preferable to sacks, as coffee has a strong attraction for damp and all scents, and its aroma will suffer by its contact with any substance. There are said to be ten varieties of coffee, but only one is found indigenous to India, and it is questionable if this is not the Mocha species introduced from Arabia.

FRENCH COFFEE.

Cafe-au-lait — that is three parts of milk to one of coffee — is, according to Dr. Doran, the proper thing for breakfast, but the addition of milk to that taken after dinner, is a cruelty to the stomach. The *"cafe noir"* of the French, is coffee made strong with water only. *"Cafe-au-lait"* must not be made by boiling coffee and milk together, as milk is not proper to extract the essential properties of the coffee, and coffee must first be made as *"cafe noir,"* only stronger. As much of this coffee is poured into the cup as is required, and the cup is then filled up with boiled milk. *Cafe a la creme* is made by adding boiled cream to strong, clear coffee, and heating them together. *Cafe glace* is made by adding one egg to every six cups of *cafe noir,* sweeten and put in cream. When thoroughly mixed, place in a proper cooler surrounded with ice. It should be frozen to the consistency of rich thick cream, and if properly made, will be found a delicious and refreshing draught.

MEERSCHAUM PIPES.

The clay of which these are made is procured chiefly in Asia Minor, and also in Spain, Greece and Moravia. The manufacture of pipes from the clay is carried on with special care at Vienna and Pesth. The meerschaum is soaked in a liquefied composition of wax, oil and fat, the absorption of which occasions the colors assumed by the pipe after smoking. Occasionally the bowls are artificially stained by dipping them in a solution of copperas and other substances, before the application of the wax composition. The carving of the bowls is often difficult work, owing to the occurrence of a kind of clay mixed up with and harder than the meerschaum; and the large quantity of parings left in roughing out the bowls would entail considerable loss unless some process had been devised for using them. This has been done, and the parings are employed in

making the kind of meerschaum bowls called *massa-bowls*. The parings are ground to a fine powder, boiled in water, and moulded into blocks, with or without the addition of clay. The blocks are allowed to dry, and then a pipe bowl is fashioned from each. These bowls are distinguished from the real meerschaum chiefly by being rather heavier.

Meerschaum bowls have been produced so large and so elaborately carved as to be valued at five hundred dollars each.

HOW POSTAGE STAMPS ARE MADE.

In printing, steel plates are used, on which two hundred stamps are engraved. Two men are kept hard at work covering them with colored inks and passing them to a man and girl, who are equally busy in printing them with large rolling hand presses. Three of these little squibs are employed all the time, although ten presses can be put into use in case of necessity. After the small sheet of paper upon which the two hundred stamps are printed have dried enough, they are sent to another room and gummed. The paste is made from clear starch, or rather its dextrine, which is acted upon chemically and then boiled, forming a clear, smooth, slightly sweet mixture, which is better than any other material, for instance, gum arabic, which cracks the paper badly. This paper is also of a peculiar texture, somewhat similar to that used for bank notes. Each sheet of stamps is taken separately, placed upon a flat board, and its edges covered with a light metal frame. Then the paste is smeared on with a large whitewash brush, and the sheet is laid between two wire racks and placed on a pile with others to dry. They are dried by fans which are operated by steam power, and when perfectly dry, the sheets are placed between sheets of pasteboard and pressed in hydraulic presses, capable of applying a weight of five thousand tons.

In the manufacture of the paste great care is taken to render it perfectly harmless, as has been conclusively proved by analysis made by eminent chemists. The method of applying stamps to the envelope by moistening with the tongue, renders this chemical caution against the presence of any poisonous or noxious ingredients in the paste, an absolute necessity. After the pressing follows more counting—in fact, stamps are counted no less than thirteen times during the process of manufacture. The sheets are then cut in half, each portion containing one hundred stamps—this being done by girls with ordinary hand shears, cutting by hand being preferred to that of machinery, which method would destroy too many stamps. They are then passed to two other squibs, which, in as many operations, perforate the sheets between the stamps. The perforation is done by machinery, and is first made in a perpendicular, and then crossed in a horizontal line. Another pressing follows—this time to get rid of the raised edges on the backs of the stamps made by the dies, and this ends the manufacture. A separate apartment is devoted to the packing and sending off the stamps to the different offices. If a single stamp is torn, or in any way mutilated, the whole sheet of one hundred is burned. About five hundred thousand are burned every week from this cause. For the past twenty years not a single sheet has been lost, such care has been taken in counting them.

WHAT IS FROST?

We have learned that dew is the floating moisture of the air gently floating down upon the grass and leaves of plants, which have become colder than itself. If, now, the grass and leaves become still colder, as they will do on an Autumn or Winter night, the tiny particles of vapor, which in Summer would make dew, are frozen as soon as they fall, and appear on the grass like little bristling needles of ice. This we call frost. It does not take the form of a smooth layer of ice all over the blades of grass, because it is the nature of water, when freezing, to take a regular form to crystalize. Whenever water freezes, little needles of ice are first seen to shoot out upon its surface, which make the same angles with each other all over the world. So it is in our houses, the moisture of the air in our rooms touches the cold glass, and, trying to crystalize, makes the curious frost work on our windows every cold morning in Winter.

A singular appearance is sometimes noticed on the rocks by the road-side and on the brick walls of houses, when in Winter there is a sudden change from cold weather to warm. As the stones and bricks are still freezing cold after the air has become warm, they condense and freeze the moisture of the air, and array themselves in a snow-white garment of frost. Scholars in school are often troubled on Winter mornings by "the frost coming out of their slates," as they call it. The slates are so wet that the pencil marks cannot be seen. This moisture on the slate, like the frost on the brick wall, is caused, not by frost, or anything else, coming out of them, but rather by the heat of the air going into them. This leaves the vapor of the air to settle upon them in the shape of dew or frost.

A large collection of frost is often seen upon the heads of nails, while no frost appears on the wood around the nails. It is the nature of iron to receive heat from any warm substance much faster than the wood does. So the air which touches the nail quickly gives up its heat to the nail, and lays down its moisture upon it to freeze; while the wood, although equally cold, being able to take only a little heat away from the air, remains quite free from frost.

MAN AND WIFE.

Thomas Jefferson wrote the following excellent advice. There is much human nature and good sense in it:

Harmony in a married state is the very first thing to be aimed at. Nothing can preserve affection uninterrupted but a firm resolution never to differ in will, and the determination of each to consider the love of the other of more value than any other earthly object whatever on which a wish can be fixed. How light, in fact, is the sacrifice of any wish when weighed against the affection of one with whom we are to pass our life. Opposition in a single instance will hardly of itself produce alienation; this only takes place when all the oppositions are put, as it were, in a pouch, which, while it is filling, the alienation is insensibly going on, and when full it is complete. It would puzzle either to say why, because no one difference of opinion has been marked enough to produce a serious effect itself. The affections are wearied out by a constant stream of little obstacles. Other sources of its discontent, very common, indeed, are

the little purpose of husband and wife in common conversation — a disposition in either to criticise and question what the other says — a desire always to demonstrate and make the other feel in the wrong, especially in company. Nothing is so goading. Much better, therefore, if our companion views a thing in a different light from what we do, leave him in the quiet possession of his views. What is the use of rectifying him if the thing be unimportant? Let it pass for the present and wait a softer moment and conciliatory occasion of reviewing the subject together. It is wonderful how many persons are rendered unhappy by inattention to the little rule of prudence.

THE DISTANCE OF A STAR FROM THE EARTH.

For many ages this question puzzled astronomers: How far off are the stars? It was known that their distance was great, very great. It was known that they were immeasurably farther off than the sun, moon, or any of the planets; but it is only in the present century that the question has been even partially answered.

Of the countless thousands of stars which stud the universe, the distance of perhaps about twenty has been determined. Others which have been tried have defied the powers of the most skillful astronomers, aided by the most elaborate instruments; their distances are too great to allow of measurement, while the rest of the vast host which stud our firmament have not yet been examined with this object.

The inquiry is one of the most delicate and subtle of any which can engage the attention of an astronomer. It is impossible to explain here the manner in which it is conducted; we must endeavor, rather, to realize the result which has rewarded these successful labors. There is a beautiful star in the Southern Hemisphere, the brightest in the constellation Centaur, one of the most brilliant stars in the heavens. This was diligently observed by the skillful astronomer who managed the observatory at the Cape of Good Hope in the years 1832 and 1833. He found, as the result of his labors, that the distance of this star — Alpha Centauri, as it is called — is twenty billions of miles.

It requires a little consideration to estimate what the words twenty billions of miles really mean. A billion contains one million millions, and we shall endeavor to convey an idea of this amount by a few simple illustrations. Supposing that our great forefather, Adam, had commenced to count as quickly as he could, and that when his life was ended his son had commenced to count, taking up from the number at which Adam left off, and spent his whole life, day and night, counting as fast as he could, and supposing that at his death he enjoined on his heirs an eternity of counting, and that they had continued doing so up to the present moment, their united efforts would not yet have reached the amount of a quarter of a billion; and yet the distance of the star is twenty billions of miles.

Another illustration may be given to convey an idea of this vast distance. If we were to take a sum equal to five times our national debt, and were to expend this in postage stamps, we should get one billion of them; and if we were to draw a line around London, including every house in the suburbs, and then take an area equal in size to this, cleared and arranged for the pur-

pose; if we then commenced to stick them side by side over the entire area of London, we should not be able to get them all in. After we had covered every inch of surface over completely, there would be countless thousands still remaining.

Such, then, is the distance of the nearest fixed star. We cannot grasp it in our imagination, nor are we more successful if we try to make a map. Suppose we proceed by first laying down the sun, and then placing the earth one inch distant from it. If we inquire at what distance the nearest star should be placed, using the same scale, we find it to be eleven miles. Such a map is, therefore, simply an impossibility.

Knowing, however, the distance of the nearest star, what can we say of the distance of the farthest of those that are visible? Here precise knowledge fails us. We can, indeed, grope after the truth, and make guesses of a greater or less probability. We believe that it is, at all events, some hundreds of times as great as the astounding magnitude of which we have endeavored to convey an impression; but the human mind becomes bewildered in attempting to realize the immensity.

PRESERVING LEAVES.

A new way of preserving autumn leaves is as follows: Iron them fresh with a warm (not hot) iron, on which some spermaceti has been lightly rubbed. This method preserves perfectly their lovely tints, and gives a waxy gloss which no other process secures. The method is very rapid and very agreeable, and no lady who has ever tried the tedious and uncertain experiment of pressing will ever again resort to it, after trying this new better way.

THE BOOMERANG.

Civilized folks are superior in so very many respects to their barbarous brethren that it is well, when we can discover anything which a savage can do better than we can, to make a note of it and give the subject some attention.

And it is certain that there are savages who can surpass us in one particular — they can make and throw boomerangs.

It is very possible that an American mechanic could imitate an Australian boomerang, so that few persons could tell the difference; but we do not believe that boomerang would work properly. Either in the quality of the wood, or in the seasoning, or in some particular which we would not be apt to notice, it would, in all probability, differ very much from the weapon carved out by the savage. If the American mechanic was to throw his boomerang away from him, we think it would stay away. There is no reason to believe that it would ever come back.

And yet there is nothing at all wonderful in the appearance of the real boomerang. It is simply a bent club, about two feet long, smooth on one side and slightly hollowed out on the other. No one would imagine, merely from looking at it, that it could behave in any way differently from any other piece of stick of its size and weight.

But it does behave differently, at least when an Australian savage throws it. We have never heard of an American or European who was able to make the boomerang perform the tricks for which it has become famous. Throwing this weapon is like piano-playing — you have to be

brought up to it in order to do it well. In the hands of the natives of Australia, however, the boomerang performs most wonderful feats. Sometimes the savage takes hold of it by one end, and gives it a sort of careless jerk, so that it falls on the ground a short distance from him. As soon as it strikes the earth it bounds up into the air, turns, twists and pitches about in every direction, knocking with great force against everything in its way. It is said that when it bounds in this way into the midst of a flock of birds, it kills and wounds great numbers of them. At other times the boomerang thrower will hurl his weapon at an object at a great distance, and when it has struck the mark it will turn and fall at the feet of its owner, turning and twisting on its swift and crooked way. The boomerang will go around a tree and return again to the thrower.

Most astonishing stories are told of the skill with which the Australians use this weapon. They will aim at birds or small animals that are hidden behind trees and rocks, the boomerang will go around the trees and rocks and kill the game. They are the only people who can with any certainty shoot around a corner. Not only do they throw the boomerang with unerring accuracy, but with tremendous force, and when it hits a man on the head, giving him two or three terrible raps as it twists about him, it is very apt to kill him. To ward off these dangerous blows, the natives generally carry shields when they go out to fight. Sometimes the Australian throws two boomerangs at once, one with his right hand and one with his left, and then the unfortunate man he aims at has a hard time of it.

Many persons nave endeavored to explain the peculiar turning and twisting properties of the boomerang, but they have not been entirely successful, for so much depends, not only on the form of the weapon, but on the skill of the thrower. But it is known that the form of the boomerang, and the fact that one of its limbs is longer and heavier than the other, gives its center of gravity a very peculiar situation; and when the weapon is thrown by one end, it has naturally a tendency to rotate, and the manner of this rotation is determined by the peculiar impetus given it by the hand of the man who throws it.

It is well we are able to explain the boomerang a little, for that is all we can do with it. The savage can not explain it at all; but he can use it.

Naval architects have attempted to apply the principle of the boomerang to screw steamships, but so far the idea has not found favor with ship builders.

HUNGARY WATER.

This perfumed liquid is said to take its name from one of the Queens of Hungary, who is reported to have derived great benefit from a bath containing it, at the age of seventy-five. It is composed thus:—Rectified alcohol, one quart; oil of English rosemary, half an ounce; oil of lemon peel, and oil of balm *(melissa),* of each a quarter of an ounce; oil of mint, seven drops; spiritous essence of rose, and spiritous essence of orange flowers, of each a quarter pint. After being well mixed it is ready for use.

It will be seen that rosemary is the leading ingredient in the above recipe. There is no doubt that clergymen and orators, while speaking for a long time, would derive great benefit from perfuming their handkerchiefs with Hungary water, or eau de Cologne, as the

rosemary they contain excites the mind to vigorous action, sufficient of the stimulant being inhaled by occasionally wiping the face with a handkerchief wetted with these "waters." Some such property of rosemary was evidently known to Shakspeare, who says, "There's rosemary, that's for remembrance." Now the poet giving us the key, we can understand how it is that perfumes containing rosemary are so universally said to be "so refreshing."

A BEAUTIFUL EXPERIMENT.

The following beautiful chemical experiment may be easily performed by a lady to the great astonishment of a circle at a tea party: Take two or three leaves of red cabbage, cut them into small bits, put them into a basin, and pour a pint of boiling water on them; let it stand an hour; then pour it off into a decanter. It will be a fine blue color. Then take four wine glasses; into one put six drops of strong vinegar; into another six drops of solution of soda; into the third, a solution of alum, and let the fourth remain empty. The glasses may be prepared sometime before, and the few drops of colorless liquid that has been placed in them will not be noticed. Fill up the glasses from the decanter, and the liquid poured into the glass containing the acid will become a beautiful red; the glass containing the soda will become a fine green; that poured into the empty one will remain unchanged. By adding a little vinegar to the green it will immediately change to red, and on adding a little solution of soda to the red, it will assume a fine green, thus showing the action of acids and alkalies on vegetable blues.

OLD PLOWS.

A plow used by the Emperor Joseph II. of Austria, in 1769, was placed beside a modern plow, in a portion of the Austrian department in the Vienna Exposition, set apart for the exhibition of the old plows of the various nations. No better proof could be given of the great advance in the improvement of plows which has marked the one hundred years which have elapsed since his Imperial Majesty worried himself and his mother earth with that plow.

This venerable plow was composed of the root of a tree, with the stem for a beam, resting on an axle with wheels underneath it of about two and a half feet in diameter; the handles were secured to the knee by holes bored into it into which the handles were secured; the share was a piece of iron about nine inches long secured to the point by the knee, and then a strip of board about six inches wide was secured near the share. This last contrivance was designed to answer the purpose of a mould-board.

The old English plows, though much in advance of this Austrian one, were very awkward and weighty affairs, such as now would not be accepted as a gift by farmers in any civilized country. Spain exhibited an old plow with shafts and a wooden share. South France, a plow constructed of wood, with the exception of the share, with wooden mould-board five inches wide. This plow was about five hundred years old.

TO MEASURE A TREE.

Walk from the tree, looking at it from time to time between your knees. When you are able to see the top of a tree in this way, your distance from the root of the tree equals its height.

WATCH SPRINGS.

Watch springs are hammered out of round steel wire, of suitable diameter, until they fill the gage for width, which, at the same time, insures equality of thickness; the holes are punched in their extremities, and they are trimmed on the edge with a smooth file; the springs are then tied up with a binding wire, in a loose, open coil, and heated over a charcoal fire upon a perforated revolving plate, and are hardened in oil, and blazed off.

The spring is now distended in a long metal frame, similar to that used for a saw blade, and ground and polished with emery and oil, between lead blocks; by this time its elasticity appears quite lost, and it may be bent in any direction; its elasticity is, however, entirely restored by a subsequent hammering on a very bright anvil, which "puts the nature into the springs."

The coloring is done over a flat plate of iron, or hood, under which a little spirit lamp is kept burning; the spring is continually drawn backward and forward, about two or three inches at a time, until it assumes the orange or deep blue tint throughout, according to the taste of the purchaser; by many the coloring is considered to be a matter of ornament, and not essential. The last process is to coil the spring into the spiral form, that it may enter the barrel in which it is to be contained; this is done by a tool with a small axis and winch handle, and does not require heat.

The balance springs of marine chronometers, which are in the form of a screw, are wound into the square thread of a screw of the appropriate diameter and coarseness; the two ends of the spring are retained by side screws, and the whole is carefully enveloped in platinum foil, and tightly bound with wire. The mass is next heated in a piece of gun barrel, closed at one end, and plunged into oil, which hardens the spring almost without discoloring it, owing to the exclusion of the air by the close platinum covering, which is now removed, and the spring is let down to the blue before removal from the screwed block.

The balance springs of common watches are frequently left soft; those of the best watches are hardened in the coil, upon a plain cylinder, and are then curled in the spiral form between the edge of a blunt knife and the thumb, the same as in curling up a narrow ribbon of paper, or the filaments of an ostrich feather.

HAND SHAKING.

How did people get in the habit of shaking hands? The answer is not far to seek. In early and barbarous times, when every savage or semi-savage was his own law-giver, judge, soldier and policeman, and had to watch over his own safety, in default of all other protection, two friends or acquaintances, or two strangers desiring to be friends or acquaintances, when they chanced to meet, offered to each other the right hand alike of offense and defense — the hand that wields the sword, the dagger, the club, the tomahawk, or other weapon of war. Each did this to show that the hand was empty, and neither war nor treachery was intended. A man cannot stab another while in the act of shaking hands with him, unless he is a double-dyed traitor and villain, and tries to aim a cowardly blow with the left while giving the right, and pretending to be on good terms with his victim.

The custom of hand shaking prevails more or less among all civilized nations, and is the tacit avowal of friendship and good will, just as a kiss is of a warmer passion. Ladies, as every one must have remarked, seldom or never shake hands with the cordiality of gentlemen, unless it be with each other. The reason is obvious. It is for them to receive homage, not to give it. They cannot be expected to show to persons of the other sex a warmth of greeting which might be misinterpreted, unless such persons are very closely related to them by family or affection, in which cases hand shaking is not needed, and the lips do more agreeable duty. Every man shakes hands according to his nature, whether it be timid or aggressive, proud or humble, courteous or churlish, refined or vulgar, sincere or hypocritical, enthusiastic or indifferent.

The nicest refinement and idiosyncrasies of character may not be discoverable in this fashion, but the salient points of temperament and individuality may doubtless be made clear to the understanding of most people by a better study of what may be called the physiology of hand shaking. To present the left hand for the purpose of a friendly greeting is a mark of discourtesy—sometimes intentional on the part of superiors in rank to their inferiors, and an act that no true gentleman will commit. There is no reason why it should be considered more discourteous than it would be to kiss the left cheek instead of the right; but doubtless the custom that makes the right hand imperative in all sincere salutations dates from those early times when hand shaking first began, and the hand that was shaken in friendship was of necessity weaponless.

Clocks were first made in England.

SOMETHING ABOUT LACE.

Large quantities of rich old lace were lost in the last century, when the French Revolution brought in gauzes and blondes, and fashion tossed aside as worthless these exquisite products of the needle. In Italy, where the custom was to preserve old family lace, less was destroyed; but in England it was handed over to servants or farm people, or stowed away in attics, and afterward burned. Some ladies gave point laces, which now they could not afford to buy, to their children to dress their dolls with. Sometimes it was thrown away as old rags. It is impossible to exaggerate the extent to which lace was used prior to the French Revolution, or the immense extravagance of the sums spent on it. Everybody wore it, even servants emulating their masters and mistresses. It trimmed everything, from the towering Fontanges, which rose like steeples from ladies' heads, to the boot-tops and shoe-rosettes of men. Men wore lace ruffles not only at the wrist, but at the knee; lace ruffs, cravats, collars, and garters; and bed furniture was made of lace, or trimmed with it, costly as it was. A pair of ruffles would amount to 4,000 livres, a lady's cap to 1,200 livres. We read that Mme. du Barry gave 487 francs for lace enough to trim a pillow-case, and 77 livres for a pair of ruffles. Lace fans were made in 1668, and lace-trimmed bouquet-holders are not a new fancy. When the Doge of Venice made his annual visit to the convent Delle Vergini, the lady abbess used to meet him in the parlor, surrounded by her novices, and present him with a nosegay in a gold handle trimmed with the richest lace that could be found in Venice. Lace has frequently employed the thoughts of

law-makers, and in 1698 was the subject of a legislative duel between England and Flanders. There was already in England an act prohibiting the importation of bone-lace, *(i. e.*, bobbin-lace), loom-lace, cut-work, and needle-work point, but this proving ineffectual, since everybody smuggled, another act was passed setting a penalty of twenty shillings a yard and forfeiture. We regret to learn that forfeiture meant, in some cases at least, burning, and that large quantities of the finest Flanders lace were seized and actually burned. It reminds one of the burning of Don Quixote's library of chivalric records. Flanders, however, with its nunneries full of lace-makers, and its thousands of people depending on the trade, had no mind to be thus crippled without retaliation. An act was immediately passed prohibiting the importation of English wool; whereupon the wool-staplers echoed with addition the groans of the lace-makers, and England was forced to repeal the act so far as the Low Countries were concerned.

As we have said, everybody in England smuggled lace in those days. Smuggling seems, indeed, to be everywhere looked on as the least shameful of law-breaking. But never, perhaps, were officers of the customs as incorruptible as these. Suspicious persons were searched, no matter what their rank, and no person living within miles of a seaport dared to wear a bit of foreign lace unless they could prove that it had been honestly obtained. Many were the devices by which men and women sought to elude the customs. When a deceased clergyman of the English church was conveyed home from the Low Countries for burial, it was found that only his head, hands, and feet were in the coffin — the body had been replaced by Flanders lace of immense value. Years after, when the body of his Grace the Duke of Devonshire, who had died in France, was brought over, the custom-house officers not only searched the coffin, but poked the corpse with a stick to make sure that it was a body. The High Sheriff of Westminster was more fortunate, for he succeeded in smuggling £6,000 worth of lace in the coffin that brought over from Calais the body of Bishop Atterbury. In the present century, Lady Ellenborough, the wife of the Lord Chief-Justice, was stopped near Dover, and a large quantity of valuable lace found secreted in the lining of her carriage.

At one period much lace was smuggled into France from Belgium by means of dogs trained for the purpose. A dog was caressed and petted at home, then, after a while, sent across the frontier, where he was tied up, starved, and ill-treated. The skin of a larger dog was then fitted to his body, the intervening space filled with lace, and the poor animal released. Of course he made haste to scamper back to his former home.

The camp, too, as well as the church and the court, has cherished lace, and the warriors of those days did not fight less gallantly because they went into battle elegantly arrayed.

A graceful fashion called the Steinkerk had a martial origin, and was named from the battle so called, wherein Marshal Luxembourg won the day against William of Orange. On that day the young princes of the blood were suddenly and unexpectedly called into battle. Hastily knotting about their necks the laced cravats then in fashion, and usually tied with great nicety, they rushed into action, and won the fight.

In honor of that event, both ladies and gentlemen wore their cravats and scarfs loosely twisted and knotted, the ends sometimes tucked through the button-hole, sometimes confined by a large oval-shaped brooch, and Steinkerks became the rage.

Dr. Johnson condescended to define net lace in his most Johnsonian manner. It is, he says, "anything reticulated or decussated, with interstices between the intersections." After that, ladies may wear their ruffles not only with pleasure, but with respect; for if he was so learned in defining plain net, what unimaginable erudition would have entered his definition of Honiton guipure, or the points of Alencon, Brussels, or Venice!

The earlier rich laces were not made of white thread. Gold, silver and silk were used. The Italians, who claim to have invented point lace, were the great makers of gold lace. Cyprus stretched gold into a wire, and wove it. From Cyprus the art reached Genoa, Venice and Milan; and gradually all Europe learned to make gold lace. In England, the complaint was raised that the gold of the realm was sensibly diminishing in this way, and in 1635 an act was passed prohibiting the melting down of bullion to make gold or silver "purl." And not only in Western and Southern Europe was this luxury fashionable. A piece of gold lace was found in a Scandinavian barrow opened in the eighteenth century. Perhaps the lace was made by some captive woman stolen by the vikings, a later Proserpine ravished from the South, who wove the web with her pale fingers as she sat in that frozen Hades, while her piratical blue-eyed Pluto looked on, marveling, and waiting to catch a smile from her relenting eyes. Gold lace was sold by weight. Some of the most magnificent old points of Venice were made of silk, the natural cream color. The rose Venice point — *Gros point de Venice, Punto a rilievo* — was the richest and most complicated of all points. It was worked of silk on a parchment pattern, the flowers connected by *brides*. The outlines of these flowers were in relief, cotton being placed inside to raise them, and countless beautiful stitches were introduced. Sometimes they were in double, sometimes in triple relief, and each flower and leaf was edged with fine, regular pearls. This point was highly prized for albs, *collaretts, berthes*, and costly decorations. Another kind of Venice lace — knotted point — had a charmingly romantic origin. A young girl in one of the islands of the Lagune, a lace-worker, was betrothed to a young sailor, who brought her home from the Southern seas a bunch of pretty coralline, called mermaids' lace. Moved partly by love for the giver, and partly by a warm admiration for the graceful nature of the sea-weed, with its small white knots united by a *bride*, the girl tried to imitate it with her needle, and, after several unsuccessful efforts, produced a delicate guipure, which soon was admired all over Europe. In the sixteenth century, Barbara Uttman invented pillow-net, a great advance in the making of lace. This lady's father had moved from Nuremberg to the Hartz Mountains, to superintend mines there, and there the daughter married a rich master miner, Christopher Uttman, and lived with him in his castle of Annaberg. Seeing the mountain girls weave nets for the miners to wear over their hair, her inventive mind suggested a new and easier way of making fine netting. Her repeated

failures we know not of, but we know of her success. In 1561 she set up a workshop in her own name, and this branch of industry spread so that soon 30,000 persons were employed, with a revenue of 1,000,000 thalers. In 1575 the inventress died, and was laid to rest in the churchyard of Annaberg, where her tombstone records that she was "the benefactress of the Hartz Mountains." Pillow-lace, as most people know, is made on a round or oval board, stuffed so as to form a cushion. On this is fixed a stiff piece of parchment with the pattern pricked on it. The threads are wound on bobbins about the size of a pencil, with a groove at the neck. As many of the threads as will start well together are tied at the ends in a knot, and the knot fastened with a pin at the edge of the pattern; then another bunch, and so on, till the number required by the lace is completed. The lace is formed by crossing or intertwining these bobbins.

Hand-made lace is of two kinds, point and pillow. Point means a needle-work lace made on a parchment pattern, also a particular kind of a stitch. The word is sometimes incorrectly applied; as, *point de Malines, point de Valenciennes,* both these laces being made on a pillow.

The only name of lace in England and France was *passement,* so called because the threads were passed by each other in the making. The learned derive lace from *lacina*, a Latin word, signifying the hem or fringe of a garment. *Dentelle* comes from the little toothed edge with which lace was finished after awhile. At first it was *passement dentelle,* but finally *dentelle.* The meaning of guipure is hard to connect with the present use of the word, which is very loose and undefined. It was originally made of silk twisted round a little strip of thin parchment or vellum; and silk twisted around a thick thread or cord was called guipure, hence the name. The modern Honiton is called guipure, also Maltese lace and its Buckingham imitations. The Italians called the old raised points of Venice and Spain guipures. It is hard to know what claim any of these have to the name. A fine silk guipure is made in the harems of Turkey, of which specimens were shown in the International Exhibition. This *point de Turquie* is but little known, and is costly. It mostly represents black, white or mixed colors, fruit, flowers, or foliage. The lace once made in Malta was a coarse kind of Mechlin or Valenciennes of one arabesque pattern; but since 1833, when an English lady induced a Maltese woman named Ciglia to copy in white an old Greek coverlet, the Ciglia family commenced the manufacture of black and white Maltese guipure, till then unknown on the island. It is the fineness of the thread which renders the real Brussels ground, *vrai reseau,* so costly. The finest is spun in dark, underground rooms, for contact with the dry air causes the thread to break. The spinner works by feeling rather than sight, though a dark paper is placed to throw the thread out, and a single ray of light is admitted to fall on the work. She examines every inch drawn from her distaff, and, when any inequality occurs, stops her wheel to repair the mischief. The *reseau* is made in three different ways: by hand, on the pillow, and more lately by machinery — the last a Brussels net made of Scotch cotton. The needle-ground costs three times as much as the pillow; but it is stronger and easier to repair, the

pillow-ground always showing the join. There are two kinds of flowers: those made with the needle, *point a l'aiguille,* and those on the pillow, *point plat.* The best flowers are made in Brussels itself, where they excel in relief (*point brode*). Each part of Brussels lace is made by a different hand. One makes the *vrai reseau;* another the footing; a third the point flowers; a fourth works the open *jours;* a fifth unites the different sections of the ground together; a sixth makes the *plat* flowers; a seventh sews the flowers upon the ground. The pattern is designed by the head of the fabric, who, having cut the parchment into pieces, hands it out ready pricked. In the modern lace, the work of the needle and pillow are combined. Mechlin lace, sometimes called *broiderie de Malines,* is a pillow lace made all in one piece, its distinguishing feature being a broad, flat thread which forms the flower. It is very light and transparent, and answers very well as a Summer lace. It is said that Napoleon I. admired this lace, and that, when he first saw the light Gothic tracery of the cathedral spire at Antwerp, he exclaimed, "*C'est comme de la dentelle de Malines.*" Valenciennes is also a pillow lace, but the ground and gimp, or flower, are all made of the same thread.

The *vrai Valenciennes,* as it was first named, that made in the city itself, was made, in the fifteenth century, of a three-thread twisted flax, and reached its climax about the middle of the eighteenth century, when there were from 3,000 to 4,000 lace-makers in the city alone. Then fashion began to prefer the lighter and cheaper fabrics of Arras, Lille, and Brussels, till in 1790 the number of lace-workers had diminished to 250. Napoleon I. tried unsuccessfully to revive the manufacture, and in 1851 only two lace-makers remained, both over 80 years of age. This *vrai Valenciennes* which, from its durability, was called *les eternelles Valenciennes,* could not, it was asserted, be made outside the walls of the city. It was claimed that, if a piece of lace were begun at Valenciennes and finished outside of the walls, that part not made in the city would be visibly less beautiful than the other, though continued by the same hand, with the same thread, upon the same pillow. This was attributed to some peculiarity of the atmosphere. That lace, therefore, which was made in the neighborhood of the city was called *batarde* and *gausse.* The makers of this lace worked in underground cellars, from 4 in the morning until 8 at night. Young girls were the chief workers, great delicacy of touch being required, any other kind of work spoiling the hand for this. Many of the women, we are told, became blind before reaching the age of 30. So great was the labor of making this lace that, while the Lille workers could produce from three to five ells per day, those of Valenciennes could not finish more than an inch and a half in that time. Some took a year to make 24 inches, and it took 10 months, working 15 hours a day, to finish a pair of men's ruffles.

It was considered a recommendation to have a piece of lace made all by one hand. This old Valenciennes was far superior to any now made under that name. The *reseau* was fine and compact, the flowers resembling cambric in their texture. The fault of the lace was its color, never a pure white, but, being so long under the hand in a damp atmosphere, of a reddish cast. In 1840, an old lady, Mlle. Ursule, gathered the few old lace-makers left

in the city, and made the last piece of *vrai Valenciennes* of any importance which has been made in the city. It was a headdress, and was presented by the city to the Duchesse de Nemours. In the palmy days of Valenciennes, mothers used to hand these laces down to their children as scarcely less valuable than jewels. Even peasant women would lay by their earnings for a year to purchase a piece of *vrai Valenciennes* for a head-dress.

The finest and most elaborate Valenciennes is now made at Ypres, in Flanders. Instead of the close *reseau* of the old lace, it has a clear wire ground, which throws the figure out well. On a piece of this Ypres lace not two inches wide, from 200 to 300 bobbins are employed, and for larger widths as many as 800 or more are used on the same pillow. There are now in Flanders 400 lace schools, of which 157 are the properties of religious communities. We may say here that lace-makers now use Scotch cotton chiefly, instead of linen, finding it cheaper, more elastic and brilliant. Only Alencon, some choice pieces of Brussels, and the finer qualities of Mechlin, are now made of flax. The difference can scarcely be perceived by the eye, and both wash equally well, but the cotton grows yellow with age, while linen retains its whiteness. Alencon, the only French lace now made on a pillow, was first made in France by an Italian worker, who, finding herself unable to teach the Alencon women the true Venetian stitch, struck out a new path, and, by assigning to each one a different part of the work, as Brussels did afterward, succeeded in producing the most elaborate point ever made.

Point Alencon is made entirely by the hand, on a parchment pattern, in small pieces afterward united by invisible thread. This art of "fine joining" was formerly a secret confined to France and Belgium, but is now known in England and Ireland. Each part of this work is given to a different person, who is trained from childhood to that specialty. The number formerly required was 18, but is now 12. The manufacture of Alencon was nearly extinct when Napoleon I. restored its prosperity. Among the orders executed for the Emperor on his marriage of Marie Louise was a bed furniture of great richness. Tester, coverlet, curtains and pillow-cases were all of the finest *Alencon a bride.* Again the manufacture languished, though efforts were made to revive it, and, in 1840, 200 aged women — all who were left of the workers — were gathered. But the old point had been made by an hereditary set of workers, and the lace makers they were obliged to call to their help from other districts could not learn their stitches, consequently changes crept in. But the manufacture was revived, and some fine specimens were shown in the Exhibition of 1851, among them a flounce valued at 22,000 francs, which had taken 36 women 18 months to complete. This appeared afterward in the Empress Eugenie's *corbeille de mariage.*

The Chantilly lace, which owed its foundation to Catherine de Rohan, Duchesse de Longueville, has always been rather an object of luxury than of commercial value. Being considered a royal fabric, and its production for the nobility alone, the lace-workers become the victims of revolutionary fury in '93, and all perished on the scaffold with their patrons. The manufacture was, however, revived, and prospered greatly during the First Empire. The white blonde was the rage in Paris in

1805. The black was especially admired in Spain and her American colonies. No other manufactories produced such beautiful scarfs, mantillas, and other large pieces. Calvados and Bayeux make similar lace but not so well. The real Chantilly has a very fine *reseau*, and the workmanship of the flowers is close, giving the lace great firmness. The so-called Chantilly shawls, in the exhibition of 1862, were made at Bayeux. Chantilly produces only the extra fine shawls, dresses and scarfs. Honiton owes its reputation to its sprigs. Like the Brussels, they are made separately. At first they were worked in with the pillow, afterward *applique*, or sewed on a ground of plain pillow-net. This net was very beautiful, but very expensive. It was made of the finest thread procured from Antwerp, the market price of which, in 1790, was £70 per pound. Ninety-five guineas have been paid a pound for this thread, and, in time of war, one hundred guineas. The price of the lace was costly in proportion, the manner of fixing it peculiar. The lace ground was spread out on the counter, and the worker herself desired to cover it with shillings. The number of shillings that found a place on her work was the price of it. A Honiton veil often cost a hundred guineas. But the invention of machine-net changed all that, and destroyed not only the occupation of the makers of hand-net, but was the cause of the lace falling into disrepute. Desirous to revive the work, Queen Adelaide ordered a dress of Honiton sprigs, on a ground of Brussels-net, the flowers to be copied from nature. The skirt of this dress was encircled with a wreath of elegantly designed sprigs, the initials of the flowers forming Her Majesty's name: Amaranth, Daphne, Eglantine, Lilac, Auricula, Ivy, Dahlia, Eglantine. Queen Victoria's wedding lace was made at Honiton, difficulty being found in obtaining workers enough, the manufacture having been so little patronized. The dress, which cost £1,000, was entirely of Honiton sprigs connected on a pillow. The patterns were destroyed as soon as the lace was made. Several of the princesses have had their bridal dresses of Honiton. A new branch of industry has lately risen there — that of restoring or re-making old lace. When old lace revived it became a mania. The literary ladies were the first to take this fever to England. Sidney, Lady Morgan, and Lady Stepney made collections, and the Countess of Blessington left at her death several large chests full of antique lace. In Paris, the celebrated dressmaker, Madame Camille, was the first one to bring old laces into fashion. Much lace is taken from old tombs, cleansed and sold, usually after having been made over. All over Europe it was the custom to bury the dead in lace-trimmed garments, and in some cases these burial toilets were of immense value. In Bretagne, the bride, after her marriage, laid aside her veil and dress, and never wore it again till it was put on after she was dead. Many of these old tombs have been rifled, and the contents sold to dealers. In Ireland, lace-making was at one time quite successful. Swift, in the last century, urged the protection of home manufactures of all kinds, and the Dublin Society, composed of a band of patriots organized in 1749, encouraged the making of lace, and passed strong resolutions against the wearing of foreign lace. Lady Arabella Demy, who died in 1792, a daughter of the Earl of Kerry, was especially active in the

work, and good imitations of Brussels and Ypres lace were made. In 1829, the manufacture of Limerick lace was established. This is Tambour work on Nottingham-net. But the emigration of girls to America, and the effort of the manufacturers to produce a cheap article, thus bringing it into disrepute, have prevented this lace from attaining success.—

PHYSIOGNOMY.

It is not only a generally admitted fact that the human face indicates mental character, but all men act upon it instinctively. We form opinions of persons by reading their characters in their faces; and we do so, as it were, by the force of impressions. We take a like or dislike to a person the first time we come in contact with him, and form an opinion, favorable or unfavorable, from some impression — the face being regarded as the index of the mind. It has been attempted to reduce the form and expressions of the human face to to a science, which has been named Pysiognomy. It certainly has not yet deservedly earned for itself the name of "a science," although there are some general truths recognizable. About sixty years ago it was as popular as Phrenology was a few years since; its great apostle then was J. Caspar Lavater, whose writings have been translated into several languages; but his opinions have, for a number of years, almost faded from remembrance. Recent efforts, however, have been made to revive them, thus showing that there are persons who still believe in the reality of physiognomy, and that it may yet be reduced to a science.

Aristotle, Bacon, Fielding, Cowper, and others believed that the face was the index of the mind, and that they could read the character of a man by his face, as well as an author by his books. The opinions of great men are not to be credited as authority on any subject as establishing a doubtful question; the best of men are liable to mistakes. A science must be its own best witness — it must contain within itself the evidences of its own truthfulness. Aristotle's opinions of natural philosophy, from the stereotyped deference paid to them by those who pretended to learning — held science in bondage for many ages. What is there in Physiognomy itself that will stand the test of examination? Experience has taught every man that the first impressions of the character, judging from the faces of individuals, are often incorrect; although they may also have been frequently right. All there has yet been written on the subject, is more curious than useful, because of the infinite variety of form and expression in the human countenance, and which never can be reduced to rule nor system. However, some of the rules which have been laid down by the ablest writers on physiognomy, for judging of persons, will be of general interest to all. An abstract of some of them — the latest adopted, we will endeavor to present from the essay in the London *Review*.

THE HAIR.

Long, soft, and light hair will, in a man, betray a feminine or child-like character; dark, coarse hair in a woman will reveal her too hard and masculine nature. In a man, dark coarse hair symbolizes strength and firmness in whatever direction it may be directed. Brown and black hair are chiefly seen in those of active character; red and fair hair are associated with passiveness. The hair of Napoleon is said

to have been soft and silky as that of a child; and the conquering Barbarossa was so named from his red beard. We therefore set down the above rules of judging of human character by the hair, like some of the rules of English grammar, in which the exceptions are too numerous to mention. Lavater always distrusted a man the color of whose hair contrasted with his eyebrows. Natural loss of hair in men often indicates a richly productive power of mind. Its abundance late in life betrays poverty and inactivity of mind. These rules have also their exceptions. Men having bushy heads in old age, like Calhoun, have been distinguished in science, art, learning and eloquence.

THE FACE.

"In general the upper half of the face has the symbols of the intellectual character and the feelings; the lower half those of the propensities and the will. The nose is symbolical of varieties of intellect; the eyes, of the disposition; the mouth, varieties of sensuous character."

THE NOSE.

"All noses less than one-third of the face in length, are of the small class. The varieties of these are numerous in the snub, flat, and up-turned or celestial. All such noses indicate defective intellectual power, and do so with a symbolism, which nothing but excellence in the form of the head, as in the case of Socrates, can neutralize. That is, Socrates was an exception to this rule of noses; so was William Pitt, the younger, and the only genuine portrait of Shakspeare, represents him with a rather short, but not pug, nor flat nose.

"The thicker and longer forms of snub nose in either sex commonly indicate the predominance of the material sensuous nature; and a turn-up nose, with wide obvious nostrils, is an open indication of an empty, inflated mind — a spurious imitation of that strength and lofty pride which the wide nostrils in a well-formed nose indicates."

Physiognomists are decidedly hostile to the upturned nose; a form which we consider decidedly excellent for taking snuff, a plea that we cannot refrain from putting in for their credit.

"Large noses in men are generally good signs, especially they add emphasis to the good indications of a well formed head, but they must not be too fleshy or too lean. If they are long, but not snout-like, they mark the intelligent, observant and productive nature of the refined mind. If Roman, arched high, and strong, they are generally associated with a less developed forehead and a larger hind head; they disclose strength of will and energy, rather than intellectual power; they also show a want of that refinement indicated by the straighter nose. The Jewish, or hawk-nose, indicates shrewdness in worldly matters; it adds force to the narrow, concentrative forehead symbolical of singleness of object; and its usual narrow nostrils wear the unfailing sign of caution and timidity. The Greek straight nose indicates refinement of character, love of the fine arts, astuteness and craft, rather than direct action.

A nose slightly bifid at its end indicates an analytic mind. Such noses, large and broad pointed, are frequent in men having acute practical knowledge of the world. The nose wide-nostriled, wide at the end, thick and broad, indicates a mind that has strong powers of thought and is given to close and serious meditation. A nose whose ridge is broad, no matter

whether straight or curved, always announces superior faculties. A small nostril is the certain sign of a timid spirit. A thick, fleshy nose indicates grossness and sensuality. A lean, sharp nose indicates want of fervor and a selfish adhesion to the formalities of life."

These opinions of physiognomists respecting the characteristics of noses, relate only to those of men; but they hold that those noses of ill-omen in men are really worse in women. These opinions must not be held correct for universal application, and yet there is much truth contained in them, as common observation will teach any man. They are, however, curiously interesting, as attempts made by some naturalists to reduce to a science, as an index of mind and character, the actual forms of men.

THE MOUNTAINS OF SCRIPTURE.

Mount Ararat, whereon, says Moses, the ark rested, consists of two peaks, separated by a valley. The great Ararat rises to the height of 17,210 feet from the level of the sea, and the lesser, or little Ararat, to 13,000. The great Ararat was ascended after much toil, by Professor Parrot, in 1829; probably then pressed by the foot of man for the first time since Noah.

Carmel, the scene of the trial between Elijah and the worshipers of Baal, as to whether Jehovah or Baal was God, is the general name of a range of hills extending north-west from the plain of Esdrælon, and ending in a bold promontory on the shore of the Mediterranean, forming the bay of Acre. The extent of the range is six miles, and the greatest height 1,500 feet.

Mounts Ebal and Gerizim, in Samaria, rise about 800 feet, having a valley about 250 paces wide between. On these hills was performed the grand ceremony, on the Israelites gaining possession of the land of promise, for which Moses had left directions. Six tribes were placed upon Mount Gerizim to bless the people, and six upon Mount Ebal to curse. In later times the Samaritans built a temple on Mount Gerizim, and they still regard it as holy ground.

Mount Hor, on the summit of which Aaron died, is situated in Arabia Petrea, on the confines of Idumea, and rises to the elevation of 3,000 feet.

Lebanon, whose renowned "cedars" are many times alluded to, is the name applied in Scripture to both the Libanus and Anti-Libanus mountains, two parallel ranges, running from north-east to south-west, on the northern shores of Palestine. The average height of the range is about 10,000 feet.

Mount Moriah, one of the hills upon which Jerusalem was built of old, and the site of Solomon's temple, and the present Mosque of Omar, is about 2,000 feet above the level of the Mediterranean, and separated from the Mount of Olives by the narrow valley of Jehosaphat.

Mount of Olives, sacred as the frequent resort of the Savior for meditation and prayer, derived its name from the number and beauty of the olive trees. It rises about 150 feet above its opposite neighbor, Moriah, and is the place of burial of the Jews.

Mount Sinai, where "the Lord descended in fire," and gave the commandments to Moses, is a wild, desolate region of granite peaks and precipices, deep ravines and water-courses. Its hight is 7,000 feet and the length of the whole is three miles.

Mount Tabor is a beautiful mountain, standing alone on the north-eastern border of the plain of Esdrælon, south from Nazareth. To this hill tradition points as the spot hallowed by the transfiguration of our Lord; and this event is still yearly celebrated there by the Latin and the Greek churches.

Mount Zion, many times alluded to in Scripture as the "holy hill," "beautiful for situation," etc., was one of the four hills upon which ancient Jerusalem was built. It is rather lower than Olivet, surrounded by the valleys of Hinnom and Jehosaphat; and at one time formed the citadel, or heart of the city.

HOW ALUM IS OBTAINED.

In some portions of Europe, alum stone, a grayish colored mineral, is found in large quantities, from which the best alum of commerce is procured. In Italy, this stone is obtained from quarries by blasting, and when exposed for a short time to a moist atmosphere, becomes friable and eventually falls to pieces.

The first process in the manufacture of this variety of alum is the erection of parallel piles of these stones, arranged in regularly formed layers, on each side of which, and in close proximity, channels are excavated and filled with water. A gentle heat is then applied, and the water sprinkled over the heaps at frequent intervals. By this treatment the stones commence to pulverize, but the moistening is continued for several weeks, as it facilitates the separation of their constituent elements. When completely pulverized the powder is thoroughly boiled in vessels specially prepared for this purpose. This process causes a subsidence of earthy ingredients, and an evaporation of all volatile foreign substances. The liquid is then withdrawn into other vessels, and allowed to remain undisturbed until the alum appears in the form of crystals, which is usually the case in the course of a few days. This is termed Roman alum, and is regarded as the most valuable variety in the market, because possessing fewer impurities than any other. It can be readily recognized by the auburn tint seen on the surface, which is imparted to it by the presence of minute particles of sulphate of iron.

Another variety of alum is manufactured from alum slate, a species of sandstone containing a large quantity of clay, which is extensively disseminated throughout different portions of the United States and Canada. In its preparation, the slates, like the alum rocks, are arranged in regularly formed masses and subjected to a certain amount of heat and moisture. At Whitby, where the most extensive manufactories of Europe are located, these masses are often built to a height of one hundred feet, and owing to the composition of these slates, twelve months, and often more, are required for the burning process. After an artificial fire has been continued for several weeks, no additional food is necessary, as the chemical changes in the ingredient will furnish sufficient material for combustion. When thoroughly pulverized by this process, the powder is placed in large vessels of water, where the soluble salts they contain are washed out, after which the liquor is boiled, and for the purpose of eliminating all impurities, condensed by the agency of heat into a powerful solution of copperas and the sulphate of ammonia or basic alum. This liquor thus condensed is conveyed into large tanks,

where the iron is chemically separated and a suitable alkali added (the basic alum not possessing the property of crystallization) which causes the formation of crystals on the side of the tanks. These are again dissolved, and the solution placed in casks, around the sides of which, in a short time, the alum crystals are re-formed, and these, when they become free from moisture, are ready for market. It is estimated that $6\frac{1}{2}$ tons of alum slate are required to one ton of alum.

THE LOST ARTS.

In regard to colors we are far behind the ancients. None of the colors in the Egyptian paintings of thousands of years ago are in the least faded, except the green. The Tyrian purple of the entombed city of Pompeii is as fresh to-day as it was three thousand years ago. Some of the stucco, painted ages before the Christian era, broken up and mixed, reverted to its original lustre. And yet we pity the ignorance of the dark-skinned children of the ancient Egypt. The colors upon the walls of Nero's festal vaults are as fresh as if painted yesterday. So is the cheek of the Egyptian prince who was contemporaneous with Solomon and Cleopatra, at whose feet Cæsar laid the riches of his empire.

And in regard to metals: The edges of the statues of the obelisks of Egypt, and of the ancient walls of Rome, are sharp as if hewn but yesterday. And the stones still remain so closely fitted that their seams, laid with mortar, cannot be penetrated with the edge of a penknife. And their surface is exceedingly hard—so hard, that when the French artists engraved two lines upon the obelisk brought from Egypt, they destroyed, in the tedious task, many of the best tools which can be manufactured. And yet these ancient monuments are traced all over with inscriptions placed upon them in olden time. This, with other facts of a striking character, proves that they were far more skilled in metals than we are. Quite recently it is recorded that when an American vessel was on the shores of Africa, a son of that benighted region made from an iron hoop a knife superior to any on board the vessel, and another made a sword of Damascus excellence from a piece of iron.

Fiction is very old: Scott had his counterpart two thousand years ago. A story is told of a warrior who had no time to wait for the proper forging of his weapon, but seized it red-hot, and found to his surprise that the cool air had tempered his iron into an excellent steel weapon. The tempering of steel, therefore, new to us a century since, was old two thousand years ago.

Ventilation is deemed a very modern art. But this is not the fact, for apertures, unquestionably made for the purpose of ventilation, are found in the pyramid tombs of Egypt. Yet thousands of years ago the barbarous pagans went so far as to ventilate their tombs, while we yet scarcely know how to ventilate our houses.

HOW TO CUT GLASS BOTTLES, Etc.

Get a rod of iron heated to redness, and having filled your vessel the exact height you wish it to be cut, with oil of any kind, you proceed to very gradually dip the red-hot iron into the oil, which heating all along the surface, suddenly the glass chips and cracks right round, when you can lift off the upper portion clean by the surface of the oil.

REGULAR EATING.

Half of all ordinary diseases would be banished from civilized life, and dyspepsia become almost unknown, if everybody would eat but thrice a day at regular times, and not an atom between meals, the intervals not being less than five hours, that being the time required to digest a full meal and pass it out of the stomach. If a person eats between meals, the process of digestion of the food already in the stomach is arrested, until the last which has been eaten is brought into the condition of the former meal; just as, if water is boiling and ice is put in, the whole ceases to boil until the ice is melted and brought to the boiling point, and then the whole boils together. But it is a law of nature that all food begins to decay after exposure to heat and moisture for a certain time. If a meal is eaten, and in two hours another, the whole remains undigested for seven hours, before which time the rottening process commences, and the man has his stomach full of carrion — the very idea of which is horribly disgusting. As then, all the food in the stomach is in a state of fermentative decay, it becomes unfit for the purpose of nutrition, and for making good, pure blood. Small wonder is it that dyspeptics have such a variety of symptoms, and aches and complaints in every part of the system, for there is not one drop of pure blood in the whole; hence the nerves, which feed on this impure and imperfect blood, are not properly nourished, and as a consequence become diseased. They "complain;" they are hungry — and like a hungry man — are peevish, fretful, restless. We call it nervousness, and no one ever knew of a dyspeptic who was not restless, fretful, fidgety, and essentially disagreeable, fitful and uncertain. The stomach is made of a number of muscles, all of which are brought into requisition in the process of digestion. But no muscle can work always. The busy heart is in a state of repose for one-third of its time. The eye can work twice in a second, but this could not be continued five minutes. The hands and feet must have rest, and so with the muscles of the stomach; they only can rest when there is no work for them to do — no food in the stomach for them to digest. — *Dr. Hall.*

THE PRISM OF ODORS.

There are certain odors which, on being mixed in due proportion, produce a new aroma, perfectly distinct and peculiar to itself. This effect is exemplified by comparison with the influence of certain colors, when mixed, upon the nerve of vision: such, for instance, as when yellow and blue are mixed, the result we call green; or when blue and red are united, the compound color is known as puce or violet. Jasmine and patchouli produce a novel aroma, and many others in like manner; and proportion and relative strength, when so mixed, must of course be studied, and the substances used accordingly. If the same quantity of any given otto be dissolved in a like proportion of spirit, and the solution be mixed in equal proportions, the strongest odor is instantly indicated by covering or hiding the presence of the other. In this way we discover that patchouli, lavender, neroli, and verbena are the most potent of the vegetable odors, and that violet, tuberose, and jasmine are the most delicate.

Many persons will at first consider

that we are asking too much, when we express a desire to have the same deference paid to the olfactory nerve as the other nerves that influence our physical pleasures and pains. By tutoring the olfactory nerve, it is capable of perceiving in the atmosphere matter of the most subtle nature; not only that which is pleasant, but also that which is unhealthy. If an unpleasant odor is a warning to seek a purer atmosphere, surely it is worth while to cultivate that power which enables us to act up to that warning for the general benefit to health.—

LEAP YEAR.

There are a great many people who do not understand the philosophy of the leap year. Some even suppose that leap year was instituted by the goddess Venus only to confer upon ladies the privilege of popping the question, or that February has twenty-nine days that it might have a chance of the luck of odd numbers. Of course it is not necessary to bring any science to bear against such notions. The subject really involves certain important niceties, which we are persuaded not more than one in a thousand clearly comprehends, and for that reason we shall try to elucidate it.

Our civil year is founded upon the period of the revolution of the earth about the sun. We say founded upon, only, for the natural or astronomical year as determined by astronomers is not the same period of time as the civil year. If the natural year had exactly 365 or 366 days, there would be no trouble; the civil year would accord with it and represent precisely the same period of time. But the natural year cannot be divided into an exact number of days; and to complicate the matter still more, astronomers show us that there are several kinds of natural years, in consequence of there being several distinct but legitimate ways of measuring the period of the earth's orbit.

We give two examples. Let the earth, the sun and a fixed star be in the same straight line at a given instant. Now the time that will elapse before they will be again in the same relative position is one kind of year. This year is called a sidereal year, and its length is 365 d. 6 h. 9 m. 9.6 sec. But if the period be measured on the ecliptic, as, for example, the time which elapses between the sun's crossing one of the equinoctial points and again reaching the same, we get a different result. This year is called the equinoctial, tropical, or solar year, and its length is 365 d. 5 h. 48 m. 49.7 seconds.

Now it has been agreed that this solar year shall be the foundation or standard of the civil year, and that the two shall be brought as nearly as possible into accord. In ancient times the subject was very poorly understood, and the civil year was constantly getting out of reckoning with the sun. The discrepancy evidently became a serious affair when the natural Winter encroached on the Summer of the calendar.

Julius Cæsar, 46, B. C., made the first reasonable and substantial reform. He saw that the solar year was about $365\frac{1}{4}$ days long — the figures were near enough the truth to answer his purpose. If the civil year be 365 days, it is a quarter of a day short of the solar year; four civil years would have lost just a whole day. He therefore ordered that every fourth civil year should have 366 days. Thus originated the leap year. By his changes

in the reckoning of time, Cæsar's name is made to live forever and to be on the lips of all men. The month of July is named in his honor, and the Julian calendar is still followed over a considerable part of the earth.

If the solar year were exactly 365¼ days, there would never have arisen an occasion to reform the Julian calendar. In fact, every Julian year gets in advance of the solar year about 10 minutes; in a century nearly a whole day.

In Cæsar's time the vernal equinox fell on the 25th of March; in the sixteenth century it had fallen back to the 11th. The difference was getting to be important, and the subject was ably discussed. The result was that Pope Gregory XIII., in 1577, approved and ordered a reform. The change actually took effect in 1582. In honor of the Council of Nice, ten days were dropped from the calendar, in order to bring the vernal equinox, for all time, on that day of the month, the 21st of March, at which it occurred in the year (325) of the meeting of the council. If there had been respect for the memory of Cæsar, fourteen days, instead of ten, would have been omitted.

To prevent a discrepancy in the future, between the solar and civil year, it was found that if only those centennial years of which the number, after suppressing the two cyphers, is divisible by four, be regarded as leap years, the purpose is accomplished. The plan was adopted. In accordance with it, 1900 will not be a leap year.

The Protestant nations and those under rule of the Greek Church, of course looked upon a reform instituted by a pope, with no favor. But Protestant Germany and Denmark adopted it in 1700; England followed in 1752, and from that time forward, "old style" and "new style" of necessity became household words wherever English was spoken. The Greek Church is, however, unrelenting, and all those nations which are under its government still adhere to the Julian calendar. The most conspicuous among these nations is Russia. Julian reckoning is now twelve days later than Gregorian.

MALACHITE.

This is a copper ore much prized in the ornamental arts. It is a peculiar variety of the green carbonate of copper, and is found in a number of localities, but perfect crystals are very rare. It usually accompanies other copper ores, and forms incrustations which, when thick, have the colors banded, and extremely delicate in their shades and blending. The copper mines of Cheshire, Conn., have produced handsome specimens, so have some of the copper mines of New Jersey, but the mines of Siberia are the most distinguished for large and fine specimens, and at the World's Fair in London, the Russian department was the admiration of all visitors, because of the numerous articles of malachite displayed.

A pair of malachite doors, fourteen feet high and 7 feet broad, were much extolled. The mineral formed the veneering, one-fourth of an inch thick, built upon a frame of metal. The pieces were most tastefully arranged, and produced a fine effect. Thirty men were employed a whole year in cutting, fitting and polishing the pieces, and the work went on, day and night, from May, 1850, to May, 1851. A fine chimney piece and numerous vases

of the same material were grouped together, the whole being valued at $90,000.

In St. Petersburg there is a large manufactory of malachite ornaments. The pieces—generally of only a few pounds weight—are first sawed into thin plates, with revolving metal disks, sand and water being fed into the slit, in the same manner that fine marble is cut. The curved pieces of this mineral are cut by bent saws, the management of which is very difficult.

The workman cuts his veneers according to the shades and veins of the mineral, so as to produce the best effect when all the pieces are fitted into the finished article. The edges of the pieces are ground quite smooth by revolving copper wheels, like those which our jewelers employ. The pieces are united with a cement colored with malachite powder, and when all fitted into a frame, the entire surface is ground and polished. The price of the finest specimens of malachite is about three dollars per pound. It receives a high polish, and is used for ear-rings, snuff-boxes, and other ornamental articles; but although it is so beautiful, owing to its delicate shadings of color, it is not much esteemed by jewelers, because it is so brittle and difficult to work; it is sometimes passed off in jewelry for turquoise, but it is inferior in hardness to this precious stone.

In the Palace of Versailles, Paris, there is one room furnished with tables, vases and other articles of malachite. The specimens found in our own copper mines have only been employed to grace cabinets, in a mineralogical sense; but the time will yet arrive when it will be used in American ornamental art, rivaling the finest productions of the Russian Empire.

FURNITURE AND ORNAMENTS OF THE ANCIENTS.

To the inquisitive student, the domestic economy of the nations of antiquity is a subject full of curious interest and instruction. Particularly is this the case in respect to the articles of furniture employed in their chambers and kitchens. Since wood, of which the largest portion of their household utensils were necessarily manufactured, is so perishable in its nature, fragmentary vestiges only exist after the lapse of centuries of time. Hence, on this subject, our information is comparatively only imperfect and limited, and must be gleaned principally from such of their monumental remains as have withstood the ravages of time: for example, bas-reliefs and various works of art, on which they were accustomed to engrave or impress representations of their different household articles.

The earliest advances in civilization and refinement are generally attributed to the ancient Egyptians. In the construction and arrangement of their dwellings, variety and ostentation, rather than uniformity and practical utility, were conspicuous characteristics, especially among the more opulent classes. The evidence of their peculiar taste in this respect is discoverable in the fact that the wings, windows and doors of any individual dwelling were rarely in exact correspondence with each other, either in design or in construction.

In so far as domestic articles of general utility and convenience, as well as many household luxuries, were concerned, modern nations are not far in advance of this people, even after the lapse of many centuries. They manufactured chairs from the most

valuable descriptions of wood, which were models of costly and exquisite workmanship, tastefully ornamented with carved ivory and the precious metals, and supplied with soft and luxurious cushions. The seats and stools designed for habitual use rather than display, bore a strong resemblance to those of bamboo manufacture, and some were constructed upon the principle of the ordinary folding camp-stool. Sofas, lounges and ottomans, rivalling the most elaborate articles of modern times, were usually found among the furniture of the wealthy classes. Their tables, both in form and structure, were not unlike those of the present day. We have also satisfactory evidence of their acquaintance with the manufacture of carpets, but to what state of excellence they attained in this industry we have no means of ascertaining, as but a single imperfect specimen, made principally from wool and linen, has been preserved. The bedsteads used by the poorer classes were of very rude construction, and seem to have been made of pliant branches of trees, roughly interlaced with each other; but among the wealthy, the frames were manufactured from iron and bronze, enriched with elegant devices, and furnished with luxurious and downy mattrasses. Their mirrors for the most part were composed of highly polished copper, to which were attached handles elaborately decorated. Their culinary utensils generally seem to have differed but little from those employed in modern times, although they were unacquainted with the use of knives and forks as articles of table furniture, using in their stead spoons and ladles. Vases seem to have constituted a prominent feature among their domestic utensils, as large numbers, in great variety, have been discovered, designed for practical, religious and ornamental purposes. The skill and taste displayed in their manufacture cannot be surpassed by all the appliances modern invention and ingenuity have devised.

The taste of their cotemporaries, the Assyrians, was differently manifested. Being a fierce and haughty people, devoted to war and its kindred pursuit, the chase, they were less interested as a nation in the comforts and elegancies of domestic life, although many relics have been discovered which attest the luxurious character of their household conveniences. Barbaric splendor and elaborate ornamentation were the chief characteristics of their furniture. They decorated profusely their tables, couches, chairs, etc., with bold, vigorous representations of animal life. Culinary utensils, both in design and construction, were very similar to those discovered among the Egyptians. Their workmanship in woods and metals was of the highest order, while a display of gorgeousness and magnificence was their chief aim and study. The domestic articles they manufactured from ivory, mother of pearl, and copper, have never been surpassed, either for boldness of design or excellence of execution, and the discovery of so many bas-reliefs and other relics attest the remarkable proficiency they attained in carving and chasing.

Writers generally unite in the opinion that the Grecians were indebted to the Assyrians for the introduction of many of the comforts and luxuries of domestic life, although in the earlier periods of their history, this people regarded them as of little consequence. Even in the time of Pericles, the most prosperous period of the existence of Athens, private dwellings made no

pretensions to stateliness in construction or elegance in their interior arrangements. These were displayed in the erection of public edifices, and buildings devoted to sacred purposes. Among the early Grecians, couches were usually made to accommodate a number of persons, and were of exceedingly simple construction, and overlaid with skins or drapery; at meals, these were occupied exclusively by the men, the females and children being seated upon chairs. Other articles of furniture, both for chamber and culinary purposes, and intended for daily use and convenience, were manufactured on a scale of similar simplicity. But in the preparation of articles designed for ornamental and sacred purposes, they rivalled the Egyptians and Assyrians, both in beauty of design and equisite execution. It will be observed that vases occupy, with all nations of antiquity, the most prominent place among all articles intended either for use or ornament. But among no people was there so great a profusion and variety as among the Grecians. Every article was distinguished for remarkable gracefulness of form and delicacy of design, and modern art in vain strives to parallel the singular beauty of the specimens antiquarians have procured. From Greece, domestic articles, both for use and ornament, were introduced among the less polished Romans, who lavished prodigal sums upon these skillful artificers. Upon the construction and decoration of their couches especially they expended almost fabulous amounts. They were not unfrequently ornamented with gold, silver, ivory and tortoise shell. Indeed, on almost every article of comfort or luxury, they were almost boundless in their extravagance. Frames of carved marble sustained their tables, and their chairs of state were elaborately chased and ornamented, and the most costly materials were employed in their fabrication.

ORIGINATORS OF INVENTIONS.

It is worthy of remark that many inventions which have influenced in a great degree the interests of the world, have been brought on by persons whose professional or business pursuits were widely different from those to which their inventions pertained. The attention of their inventors was perhaps called to the subject of the improvement by some trifling circumstance or incident, and, as if aided by some inspiration, they wrought out the idea in a tangible form.

The cotton gin has had an immense influence on the manufacturing interest of the whole world, and it is almost of unparalleled value, yet the inventor of that machine was neither an operative mechanic nor machinist, being a poor school teacher endowed with ingenious mechanical proclivities, and which were stimulated by the assertion of a female patron, upon a time when the tediousness of cotton-picking was the subject of an evening's conversation, that her friend Whitney could no doubt make a machine to accomplish this, for she believed he could make almost anything, and so his attention was called to the want of such a machine, and the result is known to every one who knows the name of Eli Whitney. The spinning-jenny, which is perhaps hardly second to the cotton-gin in the important influence it has on textile manufactures, was the invention of an English barber — Richard Arkwright.

It would almost seem preposterous

to suppose that a clergyman, whose mission is to preach peace and good will to all mankind, should be engaged in perfecting fire-arms, yet we find that a Rev. Mr. Forsyth, a Scottish clergyman, so perfected the gunlock, that within the space of twenty years the entire form and principle of that lock, changed from the flint to the percussion principle, was adopted. An English clergyman has also rendered his name famous by the invention of the power-loom, the importance of which is scarcely less than that of the cotton-gin and spinning-jenny.

Two of the most eminent names of Americans associated with the science of electricity are Franklin and Morse, the one a printer and the other a painter. The inventor of the process of puddling iron was Henry Cort, a jeweler. The first man who suggested the casting of stereotyped plates from pages of printed type was William Ged, a goldsmith of Edinburgh, and his attention was called to the subject about the year 1725, by hearing a printer lament the want of a good letter founder in Scotland. Ged suggested the taking of casts of forms of type and then casting solid plates from these casts, thus making a small stock of type serve for the preparation of large works. He was successful in producing specimens of plates, yet the invention was not put into use for fifty years after his death.

For steam navigation we are indebted more than to any one else to Robert Fulton, an American portrait painter; and J. P. Smith, an English farmer, has been mainly instrumental in the successful introduction of the screw propeller by suggesting the best method of arranging it in the ship.

From these examples, which are but a few among the many that could be cited, the mechanic and would-be inventor may learn a lesson. Although there are opportunities in his own occupation for him to exercise his inventive faculties, yet there are also opportunities in other trades, to which his attention may be directed by the expression of a want or the wish that a certain object could be attained. Oftentimes a casual remark may be the means of calling out inventions that are of some moment and bring adequate rewards.

MANUFACTURE OF HAIR CLOTH.

Our readers have, no doubt, often wondered where all the hair is obtained for the manufacture of hair cloth, and how the manufacture is conducted. There is a hair cloth factory in Central Falls, R. I. The hair used is that of horses' tails, and is imported from South America and Russia; mostly from the latter country. It is purchased at the great annual fairs of Isbilt and Nijni Novgorod. That purchased in June at the latter place will be received in about sixty days; and that bought at Isbilt, in February, in about six months. As it comes of various colors, it is, for the purpose of this manufacture, all dyed black. A certain proportion, however, is purchased in England and France, already prepared for the loom. It is worth from fifty cents to four dollars per pound, according to length, the price increasing in rapid ratio after the length attains twenty-four inches.

The "rough hair," or that which is imported in its natural state, is hackled, and the shortest sold to the manufacturers of mattrasses, it being first curled. After being hackled, the different lengths are combed out, assorted, tied in bunches, and made ready

for coloring. After this process, the bunches are carefully inspected, measured and put away for the loom. The cloth is made in widths of from fourteen to thirty-two inches.

Contrary to the popular idea, the hair is not, as a rule, round. A section under the microscope shows a form as though a third of a circle had been cut off, and the flat portion slightly indented. This conformation causes some difficulties in the manipulation, which require great skill and the most delicate machinery to overcome. The warp used is made of cotton and prepared with great care. A bunch of hair which has been soaked in water is placed in position, and the individual hairs are picked up, to be, by the shuttle, laid carefully in the weft. If the machine fail to take a hair, which occasionally happens in practice, it continues its efforts until it succeeds, the other portions of the machinery standing still in the mean time. The shuttle is an awkward looking, but most delicately operating implement. The hair must not be bruised, and it must not be stretched; the necessity for such gentle manipulation has led to the idea that no machinery could be constructed capable of performing the operation with sufficient exactitude and regularity; but this, as we have seen, is now shown to be a fallacy.

VELOCITY OF THE WIND.

When the wind moves at the rate of one mile an hour, it is hardly perceptible; at two miles an hour, it fans us as the gentle zephyr, and at six it becomes a pleasant wind. From ten to twenty, it becomes high; and thirty to fifty characterize storms from light to hard; at eighty it becomes a hurricane, and at one hundred a tornado.

HISTORY OF THE FLAX PLANT.

The flax plant was among the earliest substances adapted to the clothing of mankind, as we find in the Old Testament frequent references both to the plant and to the fabric made from it. Mr. Baines, in his "History of the Cotton Manufacture," observes that in the time of Joseph, 1,700 years before the Christian era, it is recorded that Pharaoh arrayed himself in a vesture of fine linen (Gen. xii. 42). Allusion is again made to the same manufacture two centuries later, in the time of Moses (Exod. xxxv. 26 and 35). So that linen appears to have been the national manufacture of Egypt, whose tombs afford strong evidence of the antiquity of this industrial occupation, and lead us to infer that, at least 3,500 years ago, the delicate stems of the flax plant waved on the banks of the Nile, and that the spindle and shuttle — or some substitute for these implements — were busily plied among a swarming population of weavers of linen. Paintings representing the culture of the plant have been found on the walls of sepulchres at Ebethias and Beni Hassan, in upper Egypt, and the latter contains an illustration of a kind of rude loom; linen, in fact, appears to have been the only clothing in Egypt until after the Christian era. The Egyptians exported their "linen-yarn" and "fine linen" to Israel in the days of Solomon (2 Chron. i. 14, and Prov. vii. 7), their "fine linen" to Tyre (Ezek. xxvii. 7), and the same fabric to Greece at the time of Herodotus; and under the Roman emperors they continued famous for the manufactured linen and export of flax; and, indeed, up to this period linen was the chief article of clothing in all the countries west of the Indus. The

material of which the mummy-cloths consist was long a *quæstio vexata* among the learned; but the late Mr. Thompson, of Clitheroe, has set all disputation at rest by his microscopic investigations, which proved that they were all linen fabrics.

We must now conclude this byssus of the ancients was linen. It will be seen on comparing flax, whether in the fibre or the yarn, appears in the form of transparent tubes, straight and cylindrical, and articulated or jointed like the sugar cane, although the tenacity of the fibre is not thereby impaired. The cotton filaments are flattened cylinders, twisted like a cork-screw and without joints. It is a curious fact that although the majority of the mummy-cloths are of coarse texture, some of them have been been found of a fabric rivaling the finest cambric; while at the present day, the flax of Egypt imported for our manufacture, is the coarsest flax of commerce, and cannot be made into yarn, even with our modern ingenious mechanism, fitted for weaving into a web one-third as fine as the Egyptians with the rudest appliances, upwards of 3,000 years ago, prepared as wrappers for their dead. It is probable that the culture and manufacture of flax were carried from the East to Europe by the Phœnician merchants or the Greek colonists of Egypt and Syria; and in Homer we find allusions to the manufacture of linen in Greece. Once introduced into Europe, it rapidly spread over countries whose soil and climate were congenial to its growth. The history and tales of every part of the continent teem with reference to it, as one of the most general and best understood departments of domestic routine; and at the present day there is scarcely a nook of that continent where the plant is not grown to a greater or less extent. The greatest development of the culture is between the forty-fourth and sixtieth parallels of latitude. North of these, the climate is against its success, and south of them, although some is grown, the fibre is generally of such indifferent qualities that the attention of the cultivator is chiefly directed to the production of the seed.

SPICES.

Nutmeg is the kernel of a small, smooth, pear-shaped fruit that grows on a tree in the Molucca Islands and other parts of the East. The trees commence bearing in their seventh year, and continue fruitful until they are nearly seventy or eighty years old. Around the nutmeg or kernel is a bright, brown shell.

This shell has a soft scarlet covering which when flattened or dried, is known as mace. The best nutmegs are solid, and emit oil when pricked with a pin.

Ginger is the root of a shrub first known in Asia, and now cultivated in the West Indies and Sierra Leone. The stem grows three or four feet high, and dies every year. There are two varieties of ginger, the white and black, caused by taking more or less care in selecting and preparing the roots, which are always dug in winter, when the stems are withered. The white is the best.

Cinnamon is the inner bark of a tree, a native of Ceylon, that grows from twenty to thirty feet in height, and lives to be centuries old.

Cloves—native to the Molucca Islands, and so called from resemblance to a nail (clavis). The East Indians call them "changkuk," from the Chi-

nese "techenki" (fragrant nails). They grow on a straight smooth-barked tree about forty feet high. Cloves are not fruits, but blossoms, gathered before they are quite unfolded.

Allspice—a berry so called because it combines the odor of several spices—grows abudantly on the beautiful allspice tree or bay-berry tree, native of South America and the West Indies. A single tree has been known to produce over one hundred and fifty pounds of berries. They are purple when ripe.

PARIAN ORNAMENTS.

Those beautiful small white figures—single and in groups—exposed in the show windows of large china-ware stores, and on the mantel-pieces of parlors are called "Parian marble," but they are formed of the same material as fine unglazed porcelain. In softness of tint it rivals the finest marble employed in statuary. It is composed of nearly two-thirds of ground flint, one-third of fine Chinese clay and very minute portions of lime, soda, potash, magnesia, and a trace of iron. These are very carefully calcined, ground, sifted and rendered perfectly impalpable. It is not moulded from a doughy mass, but formed into a creamy consistency (as in the finest porcelain) and poured into the moulds. The models of the figures are made by skillful sculptors, and from these moulds are taken. The parian liquid, when poured into the moulds, solidifies, and is afterwards slightly baked, until it becomes firm, when the moulds are taken to pieces, the casts liberated, and the rough parts on their surfaces carefully removed. A single mould cannot be made to cast a single figure—it is the product of several. The head, the limbs, the drapery, have so many curves that only a part of the figure is produced by one mould, and some groups require no less than fifty.

After the moulding and first baking, the most difficult part has still to be performed, namely, the building up and keeping the separate parts in perfect form. All the pieces have to be cemented together, and the joints so obliterated that they cannot be perceived.

There is also another source of trouble to the parian artist—the shrinking of the material in drying, owing to the great amount of water it contains, and which is driven off thereby. If one part of a figure shrinks more than its corresponding part, it may produce a wry-necked Venus, or a hunch-backed Adonis. And even when a figure is all made up, and its parts nicely proportioned and fitted, they have all to be further dried and finally annealed in an oven, in which processes they are liable to be injured in their form by unequal heating, whereby they may be twisted and cracked. There is, therefore, a vast amount of waste and breakage in the manufacture of parian ornaments, and this is one reason why they are so dear. But when the gracefulness of their execution and their beautiful appearance are taken into consideration, rivalling as they do the finest chiseled marbles, they are, after all, not dear, for the same work, in marble, could not be produced at a hundred times their cost.

Parian manufactures, as a new branch of the ornamental arts, are hailed by lovers of the beautiful, because such works are now brought within the reach of many, and have an elevating influence.

WHAT IS JUTE?

Jute is a fibrous plant that grows to a high stalk varying from six to twelve feet high. It is raised in the low-lands of the East Indies. The jute plantations are operated somewhat on the system of rice plantations. The water used for flooding purposes is taken from rudely constructed reservoirs filled by the melting snow of the Himalaya Mountains. The plant is kept growing in about eighteen inches of water, which prevents the parching of a tropical sun from destroying it. When the stalk has attained its growth it is pulled up by the roots or cut off near the roots. It is then laid out in bales like wheat or rye, and prepared for market.

The bark is removed. The root is cut off where it is pulled up with the stalk and where the root is not originally kept, the hard, lower end is cut off and thrown into a class commercially known as jute butts. The remainder is then assorted with regard to length, strength, fineness and lustre of fibre. The first quality is a beautiful, clear, long fibre, much of it resembling in appearance blonde hair. This is especially used for chignons, but it is also used in Scotland in the manufacture of fine jute cloths. Canvas for linings, also cloths for making cheap duster coats, and a variety of goods of that description are made in Dundee, Scotland, of a mixture of fine jute and linen or cotton. The goods into which the finer grades are manufactured in Scotland are too numerous to mention. Many kinds are sold as all linen, when actually composed of jute and linen. These mixed cloths are called "union cloths." It is a singular fact that we are not making any of them in this country.

The second and third qualities of jute are determined by inferiority of length, strength, fineness and color of fibre. Some planters and merchants in the East Indies have four qualities of jute. It will thus be understood wherein the fibres commercially known as jute butts differ. The one is the stalk itself, which is all fibre except the thin, scaly and easily removed bark; the other is a harder, coarser fibre near the root, which is discolored by the water that becomes dark after being subjected to the intense heat of the sun in the tropics.

Jute rejections are simply a mixture of all kinds of jute scraps — frequently fine jute gets tangled until unfit for first, second or third class, and frequently pieces of butts; in fact, they are exactly what the name implies — rejections of jute and jute butts. Those who use jute in this country will not buy rejection. They are used the same as butts for the coarsest matting, for heavy bagging and for paper stock. They bring in the market about the same price as butts.

OLD NEWSPAPERS.

The antiquity of newspapers dates as far back as 691 B. C., when the *Acta Diurna* was issued at Rome. Venice, in Modern Europe, published the first newspaper, the *Notizic Scritte,* about 1536. The oldest newspaper extant is probably the *Gazette de France,* which appeared first in April, 1631. It was edited by a physician — M. Renandot. Two years later Sir Roger L'Estrange published the first real newspaper in England, under the title of the *Public Intelligencer.* The *Gazette* appeared some three years later. Previous to the appearance of these regular newspapers broad sheets of

news were from time to time published, eleven of which were circulated during the time of the civil war. In 1660 an act prohibiting the publication of newspapers and pamphlets except under censorship, was passed; but in 1659 this act was abolished. The parent of English literary prints, "Mercurius Librarius," was published April 9, 1680. The first morning paper, the *Daily Courant,* appeared March 11, 1702. In Scotland the first number of the *Mercurius Politicus* was printed, by order of Cromwell, on Oct. 26, 1653. In Ireland the Dublin *News Letter* made its appearance in 1686. The letters of Junius began to appear in the *Public Advertiser* in 1767. The London *Times* appeared in 1785. At the present time France possesses about 1,640 newspapers, Germany about 1,400. Spain publishes 200. The first newspaper published in America was the Boston *News Letter,* the first number being dated April 24, 1704. It was printed on a half sheet of paper twelve inches by eight, with two columns on each page. It was published and probably edited by John Campbell, postmaster of Boston, a Scotchman. The Boston *Gazette* appeared Dec. 21, 1799, and on the next day was followed by the *American Weekly Mercurie,* from the printing office of William Bradford, at Philadelphia. In 1794 the *Commercial Advertiser* appeared in New York, and in 1801 it was followed by the *Evening Post.* In 1828, the number of newspapers in the United States had increased to 852, with a yearly issue of 68,117,000 copies. In 1832 the first penny paper, the *Sun,* was founded in New York by Benjamin H. Day. In 1835 the New York *Herald* appeared, entering the arena as a penny sheet, afterward raised to two. The number of newspapers at present in circulation throughout the Union is estimated at about 5,000, being at the rate of one per 8,000 inhabitants.

THE DEATH OF FOUR GREAT MEN.

The four conquerors who occupy the most conspicuous places in the history of the world, are Alexander. Hannibal, Cæsar, and Bonaparte.

Alexander, after having climbed the dizzy height of his ambition, with his temples bound with chaplets dipped in the blood of millions, looked down on a conquered world and wept that there was no world for him to conquer, set a city on fire, and died in a scene of debauch.

Hannibal, after having, to the astonishment and consternation of Rome, passed the Alps, and having put to flight the armies of the mistress of the world, and stripped "three bushels of gold rings from the fingers of her slaughtered knights," and made her foundations quake, fled from his country, being hated by those who had once exultingly united his name to that of their God, and called him Hanni Baal, and died at last by poison administered by his own hand, unlamented and unwept, in a foreign land.

Cæsar, after having conquered eight hundred cities, and dyeing his garments in the blood of one million of his foes, after having pursued to death the only rival he had on earth, was miserably assassinated by those he considered his nearest friends, and in that very place the attainment of which had been his greatest ambition.

Bonaparte, whose mandates kings and popes obeyed, after having filled the earth with the terror of his name, after having deluged Europe with

tears, and clothed the world in sackcloth, closed his days in lonely banishment, almost literally exiled from the world, yet where he could sometimes see his country's banner waving over the deep, but which did not and could not bring him aid.

THE LINEN MANUFACTURE.

Probably the first textile spun and woven into cloth was wool, as it would evidently suggest itself in a raw state as well adpated to this purpose; but the manufacture of linen dates from the earliest history; at least the earliest written records speak of it as well known. It was old in the time of Herodotus and the oldest Egyptian mummies are swathed in it. Among that singularly superstitious people it seems to have borne a sacred character, as their priests were forbidden to enter the temples clothed in any other than linen garments, and their dead were always shrouded in it.

On account probably of the superior ease with which cotton can be prepared for the loom, the manufacture of linen, in this country, does not seem to have attained the proportions which its value and that of the plant from which it is derived entitles it to. The extensive application of machinery to its manufacture is of quite a recent date, and even now much of the Irish linen is manufactured, from the time it is pulled to its transformation into cloth, by hand.

Massachusetts seems to have led the way in the manufacture of linen. In 1632 it seems that the people of this colony had generally turned their attention to cattle raising, importing from England most of their clothing, and all of the finer sort. In 1640 the Assembly took the matter in hand and decreed that:

"The Court taking into serious Consideration the absolute Necessity for the Raising of the Manufacture of Linnen cloths, doth declare that it is the Intent of this Court that there shall be an order settled about it, and therefore doth require the Magistrates and Deputies of the several Towns to acquaint the townsmen therewith, and to make enquiry what seed is in every Town, what men and women are skillful in the braking, spinning, and weaving, what means for the providing of Wheels; and to consider with those skillful in that Manufacture, and what course may be taken for teaching the boys and girls in all Towns the spinning of the yarn, and to return to the next Court their several and joint advice about this Thing. The like consideration to be had for the spinning and weaving of Cotton Wool."

The description of cloth to which this order applies appears to have been a mixture of linen and cotton or linen and wool. In the same year an order of the Court offered a "bounty of three-pence on every shilling's worth of linen, woollen, and cotton cloth, according to its valewation, for the incuragement of the Manifacture."

In 1662 the Assembly of Virginia enacted laws for the promotion of industry in the making of cloth and raising the materials. Flax seed was imported from England and distributed to each county and bounties offered for raising it. Two pounds of tobacco were offered for every pound of flax or hemp prepared for the spindle, three pounds for every yard of cloth a yard wide, and five pounds for every yard of woolen cloth. Every tithable person was required, under a penalty of fifty pounds of tobacco,

(then the great staple of the colony) to produce yearly two pounds of dressed flax or hemp.

The industrious Dutch matrons and maids of New Netherlands — New York — as early as 1670, are described by Denton as great manufacturers of linen. He says: "Every one makes their own linen and a great part of their woolen cloth for their ordinary wearing." In New Jersey in 1667, or soon after, Quakers from Yorkshire and London made linen cloth, and in Pennsylvania in 1693 and Delaware at about the same time one of the principal employments of their women was the spinning and weaving of linen. Scotch-Irish carried on the business extensively in New Hampshire in 1719. The first linen factory was established in "Long-Acre"— Tremont street — Boston, in 1737.

TABLE SETS EXTRAORDINARY.

At a shop in London in 1745 was exhibited a common Barcelona nutshell, holding a tea-table, tea board, a dozen cups and saucers, with sugar dish and slop basin, a bottle, a funnel, fifteen drinking glasses, five punch bowls, ten rummels, a pestle and mortar, and two sets of ninepins — all of polished ivory, exquisitely fashioned, and to be easily seen without the aid of "optic glasses." The ingenious artist, we are told, was a poor, penurious mortal, who being, by the cruel destiny of the planets, driven to the verge of destruction, had hit upon this method of saving himself. His little exhibition was, however, outdone, by the watchmaker named Boverick, dwelling near the New Exchange, hard by. For the charge of one shilling he showed his visitors half a cherry-stone, from which he took a quadrille table, twelve chairs with skeleton backs, a looking-glass, two dozen plates, six dishes, twelve spoons, a dozen knives and forks, two salts, and a lady and gentleman sitting down at a table and waited upon by a footman.

Boverick also produced a camel that could pass through the eye of a middle sized needle, and a pair of steel scissors, warranted to cut a large horse-hair, of such dimensions that six pairs might be wrapped in the wing of a fly.

Then came a chain of two hundred links, with padlock and a key, attached to a flea, the lot weighing one-third of a grain; a four-wheeled ivory chariot, with its driver and the flea serving for a steed, weighed barely a grain; and a crane-necked carriage, with wheels turning properly on their axles, carrying four passengers, two footmen, a coachman sitting on his box with a dog between his legs, driving six ivory horses, one of the leaders bearing a postilion, the whole affair so light that a single flea could set it moving.

WINDOWS.

Windows were originally openings for ventilation. The word is derived from the Welch *wyntdor*, wind-door afterwards used for light protected by mica, oiled linen, horn, paper, or glass. Strabo speaks of transparent stones for windows which were exported. Pliny also mentions horn windows for houses. Stone and glass windows were introduced into England either by Wulfrid, Bishop of Worcester, or Benedict Biscopins in 736. In the time of Edward I. were *trefoil* openings within triangles. In the reign of Richard II., they were subdivided by upright *mullions* dividing the window into *lights*. In succeeding centuries the molding grew more light

and graceful. It was long before the cloisters were closed with windows, and then not entirely, for spaces were left for access of fresh air. It is said, that the windows of Manilla in the Phillippine Islands have sliding frames fitted with concha or plates of semi-transparent oysters which admit an imperfect light, but are impervious to the sunbeams.

CONCERT PITCH.

The standard or concert pitch has long been a vexed question, although now pretty well settled. For a long series of years prior to 1839, it had been gradually rising much to the inconvenience of public singers. The C tuning-fork in use in 1699 made 489 vibrations in a second, while in 1859 the number of vibrations had increased to 538. Mr. Hullah in 1842, and under the sanction of the Committee of Council on Education in England as a public instructor, fixed a standard of 512, which had special convenience as being a power of 2. In 1858 the Imperial Government of France fixed it at 522. It was agreed on all sides that the then existing opera-pitch of 546 was too high and painful to soprano singers. A high authority, Sir John Herschel, strongly recommended 512, but instrumental performers stated that while they could lower the pitch to 528, even at that, some of them would be compelled to get new instruments. The Committee of the Society of Arts therefore fixed the standard at 528.

RESINS.

The resins best known to commerce, and used extensively in medicine and several of the mechanic arts, are nine in number, and are known as copal, lac, amber, dammar, common rosin, elemi, sandarac, mastic and caramba wax. All these resins can be reduced to powder, and all can be dissolved by a union with acids, oils or alcoholic preparations. Gum copal is the concrete juice of a tree growing in certain sections of South America and the East Indies. The substance when pure is hard, shining, transparent, citron-colored and inodorous. It is not soluble in water or spirits, but may be dissolved in linseed oil, when submitted to a heat a little less than sufficient to boil or decompose the oil. When this solution is diluted with spirits of turpentine, it forms a beautiful transparent varnish.

Shellac, or, more properly, lac, is a resinous substance, obtained mainly from the Ficus Indica, or Banyan-tree. It is composed of five different, but very similar kinds, each of which is united with a small quantity of foreign substances, particularly a red coloring matter. Stick lac is the compound in its natural state, incrusting small twigs. When broken off and boiled in water, it loses its red color, and is called seed lac. When melted, strained and spread into thin plates, it is shell lac. United with ivory black or vermillion, it forms red or black sealing wax; when lac is dissolved in alcohol or other solvents, and submitted to different methods of preparation, it constitutes various kinds of varnishes and lacquers. Lac is readily dissolved by a union with caustic soda.

Amber is a yellowish resin, and resembles copal. It is found on the seashore and frequently on alluvial soils with beds of lignite. It is capable of receiving very fine polish, and is used for ornamental purposes — to adorn pipes, walking sticks, etc. It is also

the basis for a fine varnish. By friction it readily becomes electric.

Amber will not dissolve in alcohol, but it yields to the action of concentrated sulphuric acid, which will dissolve all resins except caramba wax. The union with the sulphuric acid gives dammar a brilliant red tint, but to other resins a dark brown color.

Dammar is obtained from certain trees indigenous to the East Indies: among others the dammara and the dammar pine. It is principally used for making varnish. Dammar dissolves easily in sulphide of carbon, oil of turpentine, linseed oil and benzole.

Common rosin is the product of the Southern pine, and is readily soluble in alcohol and the essential oils.

Elemi is a concrete substance obtained from several species of trees growing in the tropics, but having much the same appearance, and undoubtedly allied in origin. It is used by the medical profession in ointments and plasters, and by mechanics as a base for the manufacture of varnish. This resin dissolves with difficulty in alcohol and linseed oil, but gives way under the action of oil of turpentine and benzole.

Mastic exudes from the mastic tree, which grows on the borders of the Mediterranean Sea. It runs freely when an incision is made in the body of the tree, but not otherwise. It is of a yellowish-white color, is semi-transparent, of faint smell, and is used as an aromatic and an astringent. It is also used by painters as an ingredient in drying varnishes.

Sandarac is the product of a tree growing in Barbary. It is obtained in what is known as transparent tears, of a white color, and is used principally for incense and the manufacture of varnish, and when pulverized and mixed with other substances in a pounce, as a perfume.

The following resins will become pasty before melting: amber, lac, elemi, sandarac and mastic; the others will become liquid at once.

Ammonia will slowly dissolve copal, mastic and sandarac; but on the other principal resins, it has very little effect.

JOURNALISM TWO THOUSAND YEARS AGO.

There seems to have been a necessity since time immemorial among at least half civilized nations to bring events of importance to the knowledge of the people by the medium of writing. To this purpose answered the hieroglyphic inscriptions of the Egyptians, the tombs of Babylon, covered with Assyrian, and the well known Marmor Radium.

The first Roman journal, over two thousand years ago, appeared only once a year. This paper, intended especially to be read by the public, was known by the title of *Annales Maximui*. The editor of this paper was Pontifex Maxius, whose duty it was to chronicle all the important events of the year. The news was written on white wooden tablets and attached to the residences of the citizens. It must have been a very curious sight to see the old Romans crowding around these tablets to get a look at the latest news. But the thirst after knowledge and the curiosity of the people grew rapidly, and in such a way that the government—the only issuer of the journal—found itself obliged to issue a daily. It is very interesting to know that some of these journals, having reached 2,044 years, are still in existence. The name of this journal was

Aeta Populi Romani Diurni, and appeared daily either as "Album" (i. e., with the tablets hung out in public), or the contents were written with red chalk on the walls of the houses. The contents of this journal comprised what would be classed as daily news in our modern papers; from the want of the necessary material, political articles were not to be had. Nevertheless, according to the views of the Roman Government, it was a true journal, and intended as reading matter for the public, which might also be inferred from the fact that the archives of State were carved in bronze and accessible to the public. Perhaps it would be of interest to peruse a copy of a verbal translation of the oldest journal known, issued 168 years before the birth of Christ. "Consul Sicinius was the acting Judge to-day. There was a heavy thunderstorm, and the lightning split an oak at the foot of the hills of Veli. In a hostelry, at the foot of the hills of James, there was a fight, in which the landlord was badly wounded. Titinius punished some butchers on account of their selling meat which had not been inspected; the money thus paid was used to erect a chapel to the Goddess Laverea. The broker Ausidius fled from town to-day, taking money with him belonging to other people; he was caught, and had to refund the money. The brigand Demiphon, who was captured by officer Nerva, has been crucified to-day. The flotilla from Astia arrived to-day."

You can see from this that it was in olden times pretty much the same as in our days; we only wish that our officials would attend to the butchers as well as Titinius did. It must be of interest to journalists to know that Julius Cæsar, the greatest of all Romans, paid special attention to journalism. He saw the necessity of instructing his people in everything occurring in the State, and we find this quotation in Suetonius:

"Julius Cæsar, as soon as he had entered his public office, caused not only to be written, but also spread among the people, the proceedings of the Senate."

This was the first political paper, and, as it contained news about buildings, births, deaths, executions and anecdotes, it can be likened very much to our modern papers. It seems incredible, but it can be proved, that already in the olden times there were stenographers who took down the speeches made in the Senate or in public. They were called "Notarri," and we find a place in Suetonius where Augustus is angry because the stenographers reported the speech of Cæsar for Metellus in a very imperfect manner. There must have been reporters, judging from a letter of Cicero to Cœlius; also, private reporters who gathered the news and sent them by the "cursus publicus," an institute similar to our mails, throughout the province.

You can see from this that Atciba's saying: "There is nothing new under the sun," is verified once more.

THE DAYS BEFORE COAL.

There can be no doubt, for it is an unquestionable fact, that the coal beds of England are the real natural source of its physical wealth. Without coal, it never would have been a manufacturing country; without it no cotton factories would ever have been erected, and no steamships would ever have floated on its waters. It is simply because it has the largest coal fields in

Europe, that it is the greatest manufacturing nation in that quarter of the world. But it was very difficult to introduce the use of coal among the old English people.

It was first used in that country about six centuries ago, and at that time the Englishmen would not use the *sooty fuel* in their houses. It did not suit the fire-places or the domestic habits of the people; but it was found well adapted for the blacksmith and the lime-burner. Only the layers near the surface and in coal fields adjacent to rivers or seas, were first opened; but when the demand increased the miners dived more deeply into the bowels of the earth, and boldly worked the coal wherever it was to be found. When the mines became deep the miners were sadly perplexed how to get rid of the water; and it was not till the steam engine came to their aid that they fully mastered this difficulty. But the prejudices of the users were as difficult to surmount as the perils of the miners. A citizen of London was once tried and executed for burning sea coal, in opposition to a stringent law passed in respect to that subject; but even long after such intolerance as this had passed away, coal was *tabooed* in good society. Ladies had a theory that the black abomination spoiled their complexion; and it was for a long time a point of etiquette not to sit in a room warmed by a coal fire, or to eat meat roasted by such means. Prejudice unquestionably had much to do with these objections; but it was not all prejudice, for the almost total absence of proper arrangements for supplying fresh air, and removing smoke and foul air, rendered the burning coal a very dirty and disagreeable companion in a room.

Wood was then the principal fuel used in England, the forests but scantily supplied the wants of the people. Turf or peat was also employed in some districts as it still is in Ireland and in the Highlands of Scotland; but in all England wood is at present unknown as a domestic fuel—coal has entirely superseded it.

DELICATE TEXTILE FABRICS.

Those who have read that charming romance by Sir Walter Scott, "The Talisman," cannot fail to remember the vivid pictures which he gives us of the state of the arts amongst the Saracens, and of the high degree of perfection which they had attained in some of its branches. In the science of medicine it is claimed that they had attained a degree of knowledge and skill which put to shame the efforts of their more clumsy and ignorant Western contemporaries. In the manufacture of delicate textile fabrics, they had certainly reached a wonderful degree of perfection; for we know from other testimony besides that of Scott, that their fine gauze veils were so perfect and so delicate that, while they did not in the slightest degree obscure the clearness of vision of the wearers, they completely excluded the fine dust of the desert, which is so annoying to travelers, and withal so penetrating that the most closely wrapped packages are not proof against it. These veils were so delicate and light, that, when skillfully thrown on the air, they floated off as if possessed of no more weight than thistle-down. And yet such was the perfection to which this same people had brought the art of sword making, that Scott represents Saladin

as throwing such a veil into the air, and dividing it in two with a stroke of his cimiter, the separate pieces floating off in different directions. With the same weapon he is said to have cut in two a light feather pillow, leaving the separate halves standing upright, as if they had remained untouched.

Although these feats find a distant record only in the pages of romance, they are said to be fully vouched for by contemporary historians, and so far at least as delicate fabrics are concerned, they are almost equalled by the spindles and looms of Hindostan. The Indian weaver, working in moist and underground apartments, not only secures for the material in which he works those conditions which are necessary for the production of the most delicate fabrics, but attains in his own person that morbidly sensitive nervous condition which confers upon him the delicate tactile power capable of producing a fabric which from its exceeding delicacy has been called "woven wind." Samples of these fabrics were exhibited at the World's Fair in 1851; and so fine were they, that a whole piece when folded to a full width could be drawn through an ordinary sized wedding ring. Even by machinery, the most wonderful results have been attained; although it may be confessed that the best looms of Manchester have not been able to equal the work of the native East Indian operative. A single pound of cotton has been spun into yarn which measured over two hundred miles,—a degree of tenuity which almost rivals that attained by the most ductile metals. We may add, that so greatly is the value of the material enhanced during this operation, that a pound of cotton, which is worth eighty-eight cents in its crude state, is worth one hundred and twenty-five dollars when converted into such yarn as we have described.

But by far the most wonderful attempt to rival the work of the Eastern artists was that made by an officer of engineers residing at Munich, who conceived the ingenious idea of employing the caterpillar itself, not only as the spinner but the weaver. Having made a paste of the leaves of the plants on which the species of caterpillar that he employs feeds, he spreads it thinly over a stone, or other flat surface, of the required size. He then, with a camel-hair pencil dipped in olive-oil, draws the pattern he wishes to leave open. This stone is then placed in an inclined position, and a considerable number of the caterpillars are placed at the bottom. A peculiar species is chosen which spins a long web; and the animals commence at the bottom, eating and spinning their way to the top, carefully avoiding every part touched by the oil, but devouring every other part of the paste. The extreme lightness of these veils, combined with some strength, is truly surprising. One of them, measuring 26½ by 17 inches, weighed about 1.51 grains, a degree of lightness which will appear more strongly by contrast with other fabrics. One square yard of the substance of which these veils are made weighs four grains and one-third; whilst one square yard of silk gauze weighs 137 grains, and one square yard of the finest net in market 262½ grains. The finest cambric muslin weighs 551 grains per sq. yard, and the colored muslin used for ladies' dresses 788 grains. These figures enable us to form an idea of the extreme tenuity of these caterpillar veils.

THE GLOSS ON SILK.

"The method of giving an artificial gloss to the woven pieces of silk," says the *Druggist's Circular*, "was invented in 1663. The discovery of the method was purely accidental. Octavio Mey, a merchant of Lyons, being one day deep in meditation, mechanically put a small bunch of silk threads into his mouth and began to chew them. On taking them out again in his hand he was struck by the peculiar luster which they had acquired, and was not a little astonished to find that this luster continued to adhere to the threads even after they had become dry. He at once saw that in this fact was a secret worth unraveling, and being a man of ingenuity, he applied himself to the study of the question. The result of his experiments was the *procede de lustrage,* or 'glossing method.' The manner of imparting the artificial gloss has, like all other details of the weaving art, undergone certain changes in the course of years. At present, it is done in this wise: Two rollers revolving on their axes are set up a few feet from the ground, and at about ten yards, in a straight line, from each other. Round the first of these rollers is wound the piece of silk, of twenty, forty, or one hundred yards in length, as the case may be. Ten yards of the silk are then unwound, and fixed by means of a brass rod in a groove on the second roller, care being taken to stretch the silk between the two cylinders as tightly as possible. A workman with a thin blade of metal in his hand daintily covers the uppermost side of the silk (that which will form the inside of the piece) with a coating of gum. On the floor under the outstretched silk is a small tramway, upon which runs a sort of tender filled with glowing coals. As fast as one man covers the silk with gum, another works the tender up and down, so as to dry the mucilage before it has had time to permeate the texture. This is a very delicate operation; for if, on the one hand, the gum is allowed to run through the silk, or if, on the other, the coals are kept too long under one place, the piece is spoiled. In the first instance it would be stained beyond all power of cleaning, and in the second, it would be burned. None but trusty workmen are confided with this task; and even with the most proved hands there is sometimes damage. When ten yards of the piece have been gummed and dried, they are rolled around the second cylinder and ten more are unwound. This is repeated till the end. But the silk, with its coating of dried gum, is then stiff to the touch, and crackles like cream-laid note-paper when folded. To make it soft and pliant again, it is rolled anew, some six or seven times, under two different cylinders, one of which has been warmed by the introduction of hot coals inside, and this is sufficient to give it that bright new look which we all admire so much in fresh silk."

TURPENTINE.

Turpentine is an oleo-resinous fluid which flows naturally or artificially from several species of trees, as pine, fir, pistaela, etc. Common turpentine is about the consistency of honey after it is separated from the comb; but there are several varieties which are more or less liquid and flowing in a state of nature. When distilled, the liquid is about the consistency of cider or vinegar.

The tree from which turpentine is

obtained in this country is known as the long-leaved pine, or pitch. It abounds in North and South Carolina, Georgia, Alabama, and several of the other Southern States. It is found only in the original forest, and when once cut down is never reproduced in the same locality. If the land is not cultivated, the pine is followed by a growth of oak, and when the latter is cut down, it is succeeded by pine, but of a greatly inferior kind and quality to the genuine.

The wood of the first growth is very firm, the tree is tall and straight, and grows to a height of forty or fifty feet, and from three to five feet in diameter. It is without branches, except at the top, and bears a very trim and handsome appearance.

In its crude state, turpentine is often obtained by tapping the trunk about a foot from the parallel of the ground. The cutting is made with an axe at the side of a tree to the depth of six or eight inches at the outside, with a slope inward. In the incision a "pocket" is scooped out, capable of holding a quart of the turpentine, which is made to collect there by the process of scarifying the bark triangularly, with an angle leading to the pocket. The larger trees have as many as three or four of these cuttings, it having been ascertained by experience that a strip of bark three inches wide between them will keep a tree alive and in good condition.

ALUMINUM—ITS PROPERTIES AND USES.

The discovery of this metal dates back only to 1827, when Wohler, a German chemist, succeeded in extracting it from clay. It is a white metal, not like silver, but having a bluish tinge. Its specific gravity is from 2.5 to 2.67, according to its purity. It is considerably lighter than flint glass, being, as seen above, only about two-and-a-half times heavier than water. Bulk for bulk it is four times as light as silver and little more than a quarter the weight of copper. It is nearly as hard as iron, but can be softened by annealing; has great rigidity and tenacity; can be turned, chased and filed with ease, never clogging the file; and can be drawn into wire as fine as a hair and rolled or beaten into sheets whose thinness can be surpassed only by those from gold and silver.

For mustard and egg spoons it would be an excellent material, as, unlike silver, it is not affected by sulphureted hydrogen or other sulphureted compounds. It retains its lustre in the ordinary atmosphere and is not affected by boiling water, diluted sulphuric, or strong nitric acid, which attacks silver, but has no action upon aluminum when cold, and it is not affected when plunged into melted niter, potass, or sulphuret of potassium, a test which even gold or platinum cannot withstand. It is dissolved, however, in muriatic acid and has a powerful attraction for chlorine.

It has been used in France and England for ornamental purposes, as finger rings, brooches, chains, etc. A cup made of it, although very thin, was not indented by falling from the hand to the pavement. These peculiar properties would seem to make it a proper material for light field guns, cuirasses, helmets and coins, but for the cost of extracting it from its earthy base of argil or clay.

When the inventive genius of man has discovered a cheap and rapid process of extracting aluminum, we may expect it to assume a much more important position in the useful, as well

as the ornamental arts, than it occupies at present. A beautiful compound is now manufactured in France and England, composed of aluminum 10 and copper 90 parts. We have seen a paper cutter, the blade and handle made of this, which had a beautiful yellow or deep straw color, was elastic, tough, and of a very fine finish. Its color is more grateful to the eye than gold and its luster brilliant. The earth metals, of which aluminum may be considered the head, will, in time, become as valuable for use as they are now for ornament or for the purpose of the chemist.

TALLY.

Tally-sticks with notches were used in ancient Egypt and by the Athenians, as a method of keeping their accounts, the name being from French *tailler*, to cut. In England they were long issued in lieu of certificates of indebtedness, to creditors of the State. In 1696 this species of security was at 40 to 60 per cent. discount, and bank-notes 20 per cent. Other records were formerly kept besides accounts on notched sticks, as almanacs in which red-letter days were signified by a large notch, ordinary days by small notches. The mode of keeping accounts by tallies was introduced into England by the Normans in 1066. Seasoned sticks of hazel or willow were provided, and these were notched on the edge to represent the amount. Small notches represented pence; large, shillings; still larger, pounds; larger and wider were 10, 100, 1,000 pounds. The stick was split longitudinally, one piece was given to the creditor and the other was laid away as a record. The voucher was compared with the record when an account was presented for payment. When paid, the *tally* and *counter tally* were tied up together and laid away, accumulating for a long series of years. In the reign of George III, the people were getting tired of this method of keeping accounts. It ceased about the year 1826, and it puzzled the authorities what to do with them. They finally in 1834, burned them in a stove, which being over-heated set fire to the House of Lords and House of Commons. This ended the tally system.

WHAT THE BLIND HAVE DONE.

The long list of the names of the blind who have been eminent in the various branches of learning, from the time of Diodatus, who lived fifty years before the Christian era, to the present time, has no parallel. The following are some of the names:

Diodatus, of Asia Minor, celebrated for his learning in philosophy, geometry and music.

Eusebius, also of Asia, who lived from 315 to 340, of the Christian era, became blind at five years of age; died at twenty-five, and yet during so short a lifetime, this blind man, by his theological writings, has come to us, and will go down to posterity, as one of the fathers of Christianity.

Henry, the minstrel of Scotland, author of the poetic life of Wallace; born blind in 1361.

Margaret, of Ravenna, born in 1505, blind at three months; noted for her writings on theology and morals.

Hermann Torrentius, of Switzerland, born in 1520; author of history and poetical dictionary.

Nicholas Sanderson, of Yorkshire, was born in 1685; learned in mathematics and astronomy, and wrote a work on algebra.

Thomas Blacklock, D. D., of Scot-

land, born in 1721; blind at six months; was celebrated for his learning in poetry, divinity, and music.

Francis Huber, of Geneva, Switzerland, born in 1750; wrote on natural science, bees, ants, and on education.

John Milton was born in 1608, in London; author of "Paradise Lost," etc.

John Metcalf, born in 1717, in England; road surveyor and contractor.

John Gough was born in 1757, in England; blind at three years; wrote on botany, natural philosophy, etc.

David Macbeth, born in 1792, in Scotland; learned in music and mathmatics, and inventor of the string alphabet for the blind.

M. Foucault was born in Paris, in 1797; invented a writing apparatus for the blind.

M. Knie, of Prussia, born blind; was director of an institution for the blind, and wrote on the education of the blind.

Alexander Rodenback, of Belgium; born in 1786; a member of the Belgian Congress, and wrote several works on the blind and deaf and mute.

Wm. H. Churchman, formerly superintendent of the institution for the blind at Indianapolis, Ind., and author of architectural designs and reports of the institution.

Rev. W. H. Milburn, born 1823; now in New York; father and brother reside in Illinois; celebrated lecturer and preacher.

BEADS.

Glass beads originated with the Egyptians. Some have been found with hieroglyphic inscriptions, showing the date to be about 1500 B. C. Glass beads and bugles, for necklaces, were used by the Egyptians, and for net-work in the mummy wrappings. They have been long in use among Eastern nations for devotional purposes, and are worn by the Chinese and Tartar Budhists, as well as by the Turks and other nations. The Chinese rosary is composed of 108 beads of coral, and stones which are sometimes as large as pigeon's eggs. The use of beads in the Christain Church is of great antiquity. They are mentioned also by St. Augustine, A. D. 366, and in the time of Cæsar, by the Druids. They are principally manufactured in Europe. Large quantities are made in Birmingham, which are sold and used for doll's eyes. Beads are made from tubes of glass of different colors; are drawn out to a great length and cut into small pieces of uniform length, which are then put in a heap with a mixture of sand and wood ashes, and stirred with a spatula until the cavities are filled. This mixture is then transferred to an iron pan, suspended over a moderate fire, and stirred until the cylindrical bits of glass assume a smooth rounded form, after which, they are removed from the fire and their bores cleaned out, when they constitute beads.

BELLOWS.

Bellows were used in Egypt in the time of Thothmes III., 1490 B. C., and are represented on a tomb bearing the name of that Pharaoh. From a cut is shown leathern bags which were inflated and compressed by men working the bellows with the feet and hands, throwing the weight on the bags alternately. One of the ancient forms of bellows was made of the skins of animals sewed up to form bags. Two such skins used alternately would give a continuous blast; this was the ancient Roman forge bellows.

"BY HOOK OR BY CROOK."

The origin of this proverbial expression is thus given in the Boston *News-Letter* of January, 1776:

"Hook and Crook were the names of two English judges at the beginning of the last century. They were both men of eminence in their profession, but not more remarkable for anything than for the perpetual diversity of opinion that prevailed between them on the seat of justice. Be the case what it would, every suitor was sure to have either Hook or Crook on his side."

CURIOSITIES OF AMERICAN POLITICAL HISTORY.

The American political history is full of curiosities and singular incidents. For instance, three of our Presidents, all of whom participated in the Revolution, died on its great anniversary, the 4th of July, viz.: John Adams, Thomas Jefferson and James Monroe.

General Washington, when he retired from the Presidency, was in the sixty-sixth year of his age. His successor, when he left, was sixty-six. James Madison had just passed his sixty-sixth year and Mr. Monroe was in his sixty-seventh, when they respectively left the chair. General Harrison was sixty-seven years old when he was elected, and died in the Presidential office.

From 1801 to 1825, the Presidential office was filled by Virginians. During the same interval, with the exception of four years, the Vice-Presidential office was steadily held by citizens of New York. John Adams negotiated the treaty of peace that concluded the war of the Revolution with England. His son, John Quincy Adams, was a leading envoy, and negotiated the treaty which ended the second war with England, in 1814. His son Charles Francis Adams, at the great crisis of our history, was the Minister to England during the recent war, from 1861 to 1865, the period which covers the "Alabama" claims, out of which another war was altogether possible with the mother country.

In 1800 John Adams was on a leading Presidential ticket. Twenty-four years after, his son, John Quincy, was also a Presidential candidate. Twenty-fours years from that time, Charles Francis Adams, John Quincy Adams' son, was an important candidate for Vice-President, with a contingent Presidential successor.

Of the first six Presidents, four of them were taken from the office of Secretary of State; and the other two being the first elected, could not perform its duties. From this fact arose the precedents that makes the Secretary of State the first office in the Cabinet, instead of the Secretary of the Treasury, which is the case in Great Britian.

The highest civil officer in the country, at the time of the Declaration of Independence, was John Hancock, of Massachusetts, the President of the Continental Congress. The highest military officer was George Washington, of Virginia. The first battle of the Revolution was fought in Massachusetts, and the last in Virginia. The first English settlement in the country was made in Virginia, and the second in Massachusetts. Of the fifty-six signers to the Declaration of Independence, three long survived upon the earth after all the others had died; and two of these had been upon the sub-committee of five which drafted the important instrument. The very last survivor, Charles Carroll, of Carrollton, Maryland, threw the first

shovelful of earth from the Baltimore & Ohio Railroad, the first railroad enterprise in this country. The last man of the past inaugurated the coming future.

No less than five of the greatest American statesmen were born in the same year, 1782: Daniel Webster, John C. Calhoun, Thos. H. Benton, Martin Van Buren and Lewis Cass. From 1800 to 1855, a period running from the second President to the seventeenth, only two persons filled the office of Chief Justice of the Supreme Court of the United States, John Marshall and Roger B. Taney.

The first Secretary of the Treasury of the United States, Alexander Hamilton, was alleged to be a defaulter.

The Capitol of the United States was located at Washington in pursuance of a corrupt bargain by which two or three members of Congress, who lived adjacent to it, and whose districts would be greatly benefitted by it, voted for the funding of the national debt for that consideration.

But two men in the United States have, as they say in Oddfellowship, passed through all the "chairs," been Governors of States, held a first-class foreign mission, been the head of the Cabinet, then Vice President and President. Their names are Thomas Jefferson and Martin Van Buren.

Three Presidents died in office: Harrison, Taylor and Lincoln.

Three persons were elected by the people Vice Presidents before they became Presidents: John Adams, Thos. Jefferson and Martin Van Buren.

Three Vice Presidents died in office; George Clinton, Eldridge Gerry and Wm. R. King.

Three men were elected President who had been Minister to England under the Federal Government: John Quincy Adams, Martin Van Buren and James Buchanan.

Three Vice Presidents became Presidents by the death of their chiefs; John Tyler, Millard Fillmore and Andrew Johnson, and every one of them pursued a policy adverse to that of the party by which they were elected.

Two of the Vice Presidents of the United States — and they the youngest men that ever held the office — have been indicted for treason: Aaron Burr, and John C. Breckinridge — and in each case the government broke down and dismissed the case without even putting it before a jury.

One Vice President, John C. Calhoun, resigned his seat as President of the Senate, to take a place on the floor, where he could have the privilege of debate, and there elucidate his State rights views under the constitution.

ATTAR OF ROSE.

In ancient times the inhabitants of the East were the largest manufacturers of perfumes, and the art of compounding sweet scents is said to have been the most largely developed in Persia and Egypt. Of late years, the French are the greatest producers, and — save in a few exceptional kinds known as Attar of Rose and Eau-de-Cologne — both in quality and variety outstrip all competitors in the markets of the world.

The trade in perfumery is immense, and the popular kinds are a staple article in the stock of every well regulated drug store, while they are also sold in large quantities by dealers in fancy goods, notions, etc. At one time musk, civet, ambergris and lav-

ender were the most widely disseminated; but of late years science has made many additions to the ingredients used for this purpose, while civet has been almost entirely banished from fashionable circles.

The base of European flower scents is comprised in six flowers, known as roses, violets, orange flowers, tuberoses, jasmine and acacia. Other flowers are used to some extent, but their odor is not of a sufficiently agreeable and distinctive character to be used separately. Besides, they can be imitated chemically to much better advantage, and both the genuine and the imitation are mostly required to tone down the stronger perfumes. The bases of the leading varieties are also toned down by the addition of geranium, lavender, rose, thyme, patchouli, and other aromatic herbs. The agreeable scent of fragrant woods, such as sandal-wood, is sometimes used for the same purpose. Some perfumes are very volatile, while others, like musk and the attar of rose, are almost imperishable:

"You may break, you may ruin the vase if you will,
But the scent of the roses will linger there still"

is as truthful as beautiful.

Attar of rose greatly differs in quality, according to the nature of the soil. The very best is obtained from the roses grown on stony or sandy ground, impregnated with oxide of iron, while the soils of a stiff and clayey nature only produce oils of an inferior character. In order to test the purity of the oil, it is put into flasks which are subsequently immersed in water at a temperature of 63 to 68 degrees Fahr., when, if prime, it will freeze. Inferior oils will not freeze, even at 52 degrees Fahrenheit.

The production is principally carried on in the districts of Kizalik, Karlowo, Kalofer, Tschripan, Eskin Saara, Jeni-Saara and Philipopoli, on the Southern slopes of the Balkan Mountains in Turkey, where are situated extensive gardens of the damask rose, semper vireus and musk rose. The distillation is advantageously carried on during a moist season, and the yield is consequently greatly enhanced by the condition of the atmosphere.

In cloudy or damp weather the rose plants blow gradually, and the harvest is greatly extended, and the gathering of the flowers rendered easy, while the distillation is carried on with great care. On the other hand, if the weather prove dry, the crop is forced, and by unduly ripening large quantities of the flowers, distillation is proceeded with more rapidly. The estimated yield for the respective seasons is, for a wet one, one mical, or 1½ drachms to eight or nine okes, or 22 to 24 pounds of the blossoms; while in a dry season, fourteen to sixteen okes, or 38 to 44 pounds of the flowers, will scarcely suffice to produce the same quantity. Manufacturers frequently adulterate the oil by a mixture of foreign substances, either obtained from plants or grasses indigenous to the country. The rose bush arrives at the highest state of perfection when growing in low and sheltered localities. In the uplands its growth is slower and more unreliable. The best quality of attar varies from 17 to 18 piastres the miscal; while inferior grades only realize from 14 to 15 piastres the miscal.

The exports from Adrianople, the chief market for its distribution, are made to both Europe and Asia, Germany being much the largest purchaser, and taking about two-thirds

the annual supply, as was seen last year, when the crop amounted to 93,750 ounces, valued at about £70,000, of which Germany secured 61,000 ounces; the remainder being sent to the East by way of Constantinople. From Germany supplies find their way to the rest of Europe and the Continent of America.

There is something peculiarly mystical about perfumes. They cannot be analyzed, like most other substances; neither can the fragrance be weighed. What, then, constitutes the odor? Sometimes it is as evanescent as the mist of the morning, and is either evaporated or carried off on the wings of the wind; but other varieties fill a room with their agreeable fragrance for years. The volume of the odoriferous body all the while appears not the least diminished, although the elements from which it was originally obtained are wholly destroyed.

NOTATION.

A system of written notation has been in use from time immemorial. The first record we have of it is of figures written with a stick, on a board covered with sand. Before that, all calculations were made with pebbles, beans, and the like. Even now, the Chinese do their calculating with little stones strung on wires in a frame. The Romans first used vertical lines—I., II., III., etc., to express numbers. The Arabic figures, which we use now, are, however, of much earlier date. It is chiefly valuable on account of the great convenience it affords by giving a figure a value, according to the place it occupies in the line. By this system the most enormous sums can be expressed, by the ten little characters which form our numerical alphabet. The decimal system of notation was practiced in Egypt before the days of history. It is now the universal system in all calculations. Even arbitrary matters, like weights, measures, or money are calculated by it.

COG-WHEEL.

Wheels with cogs to transmit power have been in use for hundreds of years, dating back to the time of Archimedes, one of the most famous mathematicians of the age. Among his inventions were the combination of pulleys for lifting heavy weights, and the revolving screw. He was acquainted with toothed wheel-work before the Christian era. Thomas Young does not doubt that Ebn-junis, at the end of the tenth century, had applied the pendulum to the measurement of time, but ascribes the first combination of the pendulum with wheel-work to Santoni in 1612. The clock of Ctesibus under Ptolemy, which gave the civil hours throughout the year at Alexandria. was, according to the description of Vitruvius, a complicated hydraulic machine worked by means of toothed wheels. The original mode of construction was to insert *cogs* or pieces of wood into notches in the face of the wheel. The substitution of the iron for the wooden wheel is originally due to Sweaton, who introduced iron wheels at Carron, in Great Britian, in 1754, and at Derbyshire shortly after. About the same time, Murdock used a cast-iron bevel wheel in Scotland. The credit of the application of cast-iron for mill work is due to John Rennie, an eminent and successful engineer, who, in 1784, adopted it for bevel and spur wheels at Boulton and Watts' Rolling Mill and Foundry. Cog, spur and ratchet wheels are now universally used in the construction of all kinds of light and heavy machinery.

AQUEDUCTS.

The construction of artificial channels for the conveyance of water dates far back in antiquity. We find evidences of their existence among nearly all nations. In the reign of King Solomon capacious reservoirs were constructed from which water was carried six miles by an aqueduct to Jerusalem; and it is said that such is their present state of preservation that this city still receives a large supply of water from this source. In Mexico, during the reign of Montezuma, an aqueduct, many miles in length, furnished water to the capital, and its ruins testify to its ancient magnitude and grandeur.

The most remarkable aqueducts on record, either in respect to their length, the difficulties attending their construction, or the vast expense they involved, are those of the Incas of Peru. These sagacious rulers were compelled to adopt this course for the purpose of fertilizing their barren and sandy territory, which was unproductive without artificial irrigation. These aqueducts were several hundred miles in length, and some portions necessarily built upon the slopes of the Andes. These portions often required tunnels which penetrated the solid rocks, and again were carried over wide chasms, compelling the erection of walls of solid masonry, which had to be constructed without the assistance of those labor-saving appliances that modern mechanical genius has invented. Even the use of steel or iron tools was then unknown. These aqueducts were of massive blocks of hewn stones, nicely adjusted to each other without any cement, with the manufacture of which the Peruvians were entirely unacquainted. The most celebrated of these aqueducts extended a distance of between four and five hundred miles, and bear the most remarkable evidence of the energy and perseverence of this people. We find authentic records of similar structures, though of far more limited proportions, in Egypt and Babylonia, but our information respecting them is too meagre and unsatisfactory to justify more than a passing notice.

But no nation of ancient or of modern times, even with all the advantages advanced science and mechanical inventions have conferred, have excelled the Romans in the wonderful skill and ingenuity which their aqueducts show. Historical evidence establishes the fact that not less than twenty-four of these structures, varying in length from ten to sixty-five miles, conducted water into the city of Rome. Though their knowledge of civil engineering, compared with modern attainments, was very circumscribed, they yet readily overcame the difficulties which natural impediments presented. Being unacquainted with the manufacture and use of the strong metallic pipes now employed by means of which ravines and rivers are crossed, by descending on one side and ascending on the other, they were compelled to construct their conduits upon grades of easy and regular descents, otherwise the pressure of heavy columns of water would seriously endanger if not destroy them. On account of the circuitous routes, which, for this reason, they were frequently forced to follow, their aqueducts were of much greater length than modern science would have indicated. One of these, styled the New Anio, extended more than sixty-three miles, and in consequence of the depressed state of territory over which it passed, six and a half miles were supported on an uninterrupted se-

ries of arches, many of which were one hundred feet in height. Another, the Aqua Martia, was thirty-eight miles in length, in the construction of which seven thousand arches were required. Hard burnt brick on polished and delicately adjusted stone work, imbedded in cement, were used in the construction of these water courses. The quantity of water supplied to the citizens of Rome by these stupendous works is without a parallel in modern times. One ancient writer, in his enthusiasm, declared that whole rivers flowed through the streets of Rome. To an estimated population of 1,000,000 citizens, not less than 50,000,000 cubic feet of water were daily supplied, or more than 300 gallons to each individual. The Roman people built other similar structures in various portions of their possessions. One at Metz, in Belgic Gaul, is reported to have excelled in magnitude and grandeur even those which supplied the capital.

In modern Europe we find many works of this description worthy of note, particularly in Turkey and Spain, but the most deserving of mention is that constructed by Louis the XIV., at Versailles. The bridge by which it is supported is pronounced by engineers one of the most splendid triumphs of modern art. It is about forty-four hundred feet in length, more than two hundred in height, and rests upon three tiers of arches, one upon another, each tier comprising two hundred and forty-two arches, with a space of fifty feet. This aqueduct is sixty miles in length, passes through forty-five tunnels, and has the capacity to discharge 198,000 gallons of water per minute.

Among the more modern aqueducts, which can now be found in almost every city of any magnitude, those of New York, Philadelphia and Boston, are noted. The city of Boston is supplied by Lake Cochituate, which comprehends a water area of nearly seven hundred acres, and is distant about twenty-three miles from the reservoir in East Boston. This is capable of supplying 10,000,000 gallons every twenty-four hours.

New York City is supplied by the Croton River, which, at the point where the aqueduct starts, is distant from the distributing reservoir, on 40th street, forty and a half miles. The receiving reservoir is capable of holding 150,000,000 gallons, and the distributing reservoir 20,000,000. The whole cost of this invaluable enterprise was nearly eleven million dollars.

THE INVENTION OF THE THERMOMETER.

The first thermometer appears to have been constructed by Galileo in 1597. It depended upon the dilatibility of the air. A glass bulb was joined to the extremity of a glass tube, and a little column of liquid introduced into the tube by the open extremity. By this simple means a small volume of air was imprisoned in the instrument, and this air being separated from the atmosphere by the little column of liquid, its quantity always remained the same. When an instrument thus constructed is put in a warm place, the liquid index increases its distance from the bulb, which shows that the air contained gets warmer, and augments in volume, retaining a pressure nearly equal to that of the atmosphere, which acts on the index by the open extremity of the tube.

Inversely, when the thermometer is put in a colder place, the column of water sinks — that is to say, the index approaches nearer to the bulb, because

the contained air is cooled and reduced in volume.

Many savans in Galileo's time applied themselves to the study of the thermometer. In fact, the foundation of modern physics was then laid. They felt the necessity of creating instruments for observing natural phenomena in a better manner than had yet been done. The thermometer of Cornelius Duebbel, son of a Dutch peasant, came rapidly into use in Flanders and England. This, also, consisted of a glass bulb and tube containing air. The tube is placed vertically, and its open extremity plunged under some liquid contained in a little dish. To regulate the quantity of air which should remain in the bulb, it is warmed, which causes several bubbles to escape; after this, it is allowed to cool. The liquid then rises in the tube, and its level serves as an index, like that of Galileo's thermometer.

CHEMISTRY.

The word chemistry is derived from the Arabic, and was originally the art or science now called alchemy, which was the supposed gift of a certain few individuals who possessed the power of turning the baser metals into gold.

The Arabic word *kama* signifies to hide, secrete, or conceal. The art of alchemy is of very great antiquity, and is supposed to have been practiced as early as the third century. The Emperor Diocletian made an order directing search for books or writings treating of the wonderful art of transmuting the baser metals into gold and silver, and commanding that all such books or writings, when found, should be committed to the flames, and that all the implements, retorts, powders or liquids used for such purpose should likewise be destroyed.

Alchemy was long connected by the ignorant and superstitious with the power and attributes of the devil, and its possessors were charged with being in league with him in the practice of what was known as the *black art.*

It is thought by many erudite people that the art of counterfeiting the ancient coins had its origin in the study and manipulations of the alchemist, and that in those early times the secret manner in which these mysterious beings worked, the care they exercised, and holding themselves aloof from society, was with a view to hide their employment from the public gaze, while, by means of their knowledge of the arts and their acquired skill in other respects, they were enabled secretly and successfully, to a greater or less degree, to flood the channels of commercial circulation with base silver and gold.

The alchemist, with the purpose also of gaining credit with the masses, pretended to have found a universal remedy for disease, and an *alkahest,* or universal solvent, for every known substance. This pretended science flourished greatly from the thirteenth to the seventeenth century, but is now held in universal contempt.

After the downfall of the race of alchemists, the true science of chemistry grew up and developed into harmonious proportions. It endeavored to discover by analysis and synthesis the nature and properties of different bodies, and the changes of composition that occur among the integrant elements under certain combinations.

The use of symbols was early employed by the alchemists to represent the metals known to them, the metals themselves being at the same time

called after the heavenly bodies. The early chemists also used a few symbols that seemed appropriate to their occupation, and for many centuries these continued to be employed without material alteration. Early in the beginning of the present century the chemist Brezelius proposed a modified system of characters, which rendered it possible to write the exact composition of chemical compounds by weight, and which also indicated chemical reactions. This system of symbols was used until a comparatively recent period, but the chemist Gerhardt proposed some slight modifications, which would render it possible to represent the volume as well as the weight of the substances entering into a compound, besides being a ready and simple means of illustrating the complex changes arising in organic substances from chemical action. This science occupied a low position for many hundred years, and not until within the last two centuries has it made decided and permanent advancement. It is true, there are a few exceptions, such as the tanning of leather; the knowledge of certain coloring matters or dyes, among which was the real Tyrian purple; an acquaintance with the properties of certain plants, drugs and resins; and the manufacturing of glazed pottery, which the Persians carried on to a great degree of perfection.

One great and essential benefit conferred on mankind by the discoveries of modern chemistry, has arisen from the utilization of waste substances. The bones of dead animals are revitalized in the shape of phosphorus; the dregs of the wine cask return to us in the shape of seidlitz powders; the washings of coal gas and sewers are, by distillation, converted into ammonia; glycerine is the sweet principle of fatty or oily substances; glues and jellies are made from the hoofs or bones of domestic animals; chlorine is more or less used as a substitute for sulphur in bleaching. Absorption and distillation have given us numberless extracts, cordials and perfumes, and there is scarcely a plant, tree or fruit, but, in some form or other, has been made to render up certain active principles of its composition, which, but for the subtle agencies of chemistry, would have remained inert, or in a crude state; but when thus developed, under various forms of application, either medicinally or otherwise, add something to the general welfare of mankind.

The greatest benefits, however, have been experienced from this science in its bearings upon the sanitary reforms of the last century. Men are now better housed and fed; noxious diseases are more scientifically treated, and the spread of pestilence and famine curtailed. The diffusion of intelligence in regard to light, heat and ventilation, is very general; the causes and prevention of miasma in city and country receive the attention of local governments, and there is a disposition everywhere to make the most of the advantages presented by country, climate and condition, for the elevation and social happiness of the human race.

If the alchemist of old failed to accomplish the turning of the baser metals into gold and silver, and the discovery of a panacea for human ills, he at least stimulated a spirit of inquiry which has borne fruit in the investigations and experiments of the pains-taking chemist and his coworkers in other scientific pursuits.

Saddles came into use in 4th century.

HISTORY OF GLOVES.

Gloves are not a modern invention, although they are much more used at present than in former times. Xenophon describes the ancient Persians as wearing gloves, and Varro informs us that they were of long standing among the Romans. But they were often worn only as a protection of the hand in particular cases; in warm climates they were not thought very necessary, and it was only in cold countries that their use became general. Gloves were, in the early ages of Christianity, introduced as a part of monastic costume, and, in later periods, formed an essential part of the Episcopal habit. The glove was employed by princes as a token of investiture; and to deprive a person of his gloves was a mark of divesting him of his office. Throwing down a glove constituted a challenge, which he accepted who took it up, a custom which was continued down to the reign of Elizabeth, and this ceremony was performed, perhaps for the last time, at the coronation of George IV., when his majesty's champion entered Westminster Hall, completely armed and mounted, and, throwing down his glove, challenged any one to dispute the right of his sovereign to the crown. Gloves were particularly used in hawking; and the custom of presenting them at weddings and funerals is still general. They were formerly considered as a valuable New Years gift, when they were richly worked and embroidered.

Gloves were made of various materials: leather, silk, linen thread, cotton thread, cotton cloths and worsted. The good qualities of gloves are strength, warmth in Winter, coolness in Summer, elasticity in fitting well, and to be well sewed in the seams. There is a distinction, also, between those which will bear washing and such as will not; likewise, in the manner of sewing.

Of leather gloves, there are a great many kinds, according to the quality of the material, or the uses for which they are required. Of these, the principal are:

Kid gloves, the most beautiful, from their softness, thinness and elasticity, fitting the hand almost like a second skin. They are white, and dyed of all colors, but white kid is always worn in full dress. Those of French manufacture are certainly superior to ours in the neatness of the workmanship, and for elasticity they are highly prized. This superiority has occasioned many imitations in this country, and it is said that most of what are sold for French are, in fact, home-made from French or Italian skins. There are few goats in England; therefore the kid leather is chiefly imported from Switzerland and Tuscany, whence it comes by way of Leghorn. Most of the lower-priced gloves sold for kid are made of lamb-skin, which is thicker; a vast many are made in Worcestershire.

It used formerly to be the custom in the southwest of Ireland to slaughter many cows while in calf. The skins of these unborn calves were of extraordinary fineness and delicacy, and from such was prepared the leather of which the celebrated Limerick gloves were made. This practice is now, however, almost discontinued; and whatever merit the Limerick gloves may still possess is owing to the skill of the manafacturer, and not to the superiority his raw material, which is generally kid leather. Beaver gloves are among the most common of the cheap leather gloves, manufactured chiefly at Here-

ford; they are dyed of many colors, but they do not wash. Woodstock gloves are a superior kind of soft leather, made of lamb-skins, which have the advantage of bearing washing; they are manufactured chiefly at Woodstock, in Oxfordshire, which has been celebrated for them ever since the time of Queen Elizabeth. Buck-skin is the strongest kind of leather gloves, and washes well. It may be had white, and of various colors. Doe-skins are of a thick, strong, and soft leather; bear washing. Tan leather is the name of a very servicable, strong and cheap glove for riding, driving or gardening; its color is that of bark or tan, and it is either common or York tan. Sheep-skin is not much used, except in the army; it is generally white. Leather gloves are sometimes lined with fleecy hosiery or fur for winter, and are sometimes cuffed.

THE WEDDING-RING FINGER.

By almost universal consent this is the fourth finger on the left hand. Why this particular digit should have received such a token of honor and trust beyond all its cogeners, both in Pagan and Christian times, has been variously interpreted. The most common explanation is, according to Sir Thomas Browne, "presuming therein that a particular vessel, nerve, vein or artery is conferred thereto from the heart;" which vascular communication Browne shows to be anatomically incorrect. Macrobius gives another reason, which may perhaps satisfy those anatomists who are not satisfied with the above. "Poliex," he says, "or thumb (whose office and general usefulness are sufficiently indicative from its Latin derivation *poello* and from its Greek equivalent *antichier,* which means 'as good as a hand') is too busy to be set apart for any special employment; the next finger to the thumb, being but half protected on that side, besides having other work to do, is also ineligible; the opprobrium attached to the middle finger, called *medicus,* puts it entirely out of the question; and as the little finger stands exposed, and is, moreover, too puny to enter the list in such a contest, the spousal honors devolve naturally on *prounbus,* the wedding finger." In the *British Apollo*, 1788, it is urged that the fourth finger was chosen, from its being not only less used than either of the rest, but more capable of preserving a ring from bruises; having this one quality peculiar to itself, that it cannot be extended but in company with some other finger, whereas the rest may be stretched out to their full length and straightness.

DENTAL SURGERY.

This includes the surgical treatment of the teeth — their extraction, the remedying of serious defects, and the mechanical operation of making and fitting artificial teeth to supply the place of those lost. Although it is less than a century since this art has taken the rank of a distinct profession, attention was directed from the earliest periods to the means of preserving and improving the beauty of the teeth. The ancient Hebrew writers evidently appreciated their importance in giving expression to the countenance, as when Jacob, blessing Judah, says, "His teeth shall be white with milk," and Solomon compared a fine set of teeth to a flock of sheep even shorn. In the time of Herodotus the art of Dentistry appears to have been practised in Egypt, as a distinct branch of surgery.

Little, however is known of the attainments of those early practitioners. In the ancient tombs of these people, artificial teeth of ivory or wood were found by Belzoni and others, some of which were fastened upon gold plates. It is also stated that the teeth of the mummies have been found filled with gold. Thus it would seem that the Egyptians understood processes of the art which are commonly regarded as only the inventions of the refined nations of modern times. In the year 1836, the eminently practical work, "Principles of Dental Surgery," of Leonard Koecker, M. D., who had practised dentistry from 1807 to 1822, in Baltimore and Philadelphia, appeared in London, and fully established the claims of the art to take rank as a distinct branch of science. It appears that in 1776, Duchateau, a chemist of St. Germain en Laye, succeeded with the aid of Dubois, a dentist of note in Paris, in producing artificial teeth. They imitated the color of the natural teeth and gums by the use of mineral oxides, and obtained royal letters patent from Louis XIV. for the invention. The practice of dentistry was introduced into the United States by Le Mair, of the French force which joined our army during the revolutionary war. About 1788, Mr. John Greenwood established himself in New York, the first American of this profession. In 1795, he carved in ivory an entire set of teeth for Gen. Washington.

BEAUTY IN AGE.

History is full of the accounts of the fascinations of women who were no longer young. Thus, Helen of Troy was over forty years old when she perpetrated the most famous elopement on record, and as the siege of Troy lasted a decade, she could not have been very juvenile when the unfortunate Paris restored her to her husband, who is reported to have received her with unquestioning love and gratitude. Pericles wedded the courtezan Aspasia when she was thirty-six, and yet afterwards, for thirty years or more, she wielded an undiminished reputation for beauty. Cleopatra was past thirty when Anthony fell under her spell, which never lessened until her death, nearly ten years after; and Livia was thirty-three when she won the heart of Augustus, over whom she maintained her ascendency to the last. Turning to more modern history, where it is possible to verify dates more accurately, we have the extraordinary Diano de Portiers, who was thirty-six when Henry II. (then Duke of Orleans, and just half her age,) became attached to her; and she was held as the first lady and most beautiful woman at court, up to the period of the monarch's death and of the accession to power of Catherine of Medicis. Anne of Austria was thirty-eight when she was described as the handsomest queen of Europe, and when Buckingham and Richelieu were her jealous admirers. Ninon de l' Enclos, the most celebrated wit and beauty of her day, was the idol of three generations of the golden youth of France, and she was seventy-two when the Abbe de Berns fell in love with her. True it is, that in the case of this lady, a rare combination of culture, talents and personal attractions endowed their possessor seemingly with the gifts of eternal youth. Bianca Capello was thirty-eight when the Grand Duke Francesca of Florence fell captive to her charms and made her his wife, though he was five years her junior.

Louis XVI. wedded Madame de Maintenon when she was forty-three years of age. Catherine II. of Russia was thirty-eight when she seized the empire of Russia and captivated the dashing young General Orloff. Up to the time of her death, at sixty-seven, she seems to have retained the same bewitching powers, for the lamentations were heartfelt among all those who had ever known her personally. Mlle. Mars, the celebrated French tragedienne, only attained the zenith of her beauty and power at the age of forty-five. At that period the loveliness of her hands and arms especially was celebrated throughout Europe. The famous Madame Recamier, was thirty-eight when Barras was ousted from power, and she was, without dispute, declared to be the most beautiful woman in Europe, which rank she held for fifteen years.

ANCIENT AND MODERN COINAGE.

Platinum was coined in Russia from 1828 to 1845. But the metals best adapted and most generally used as coin, are copper, nickel, silver, and gold; the first two being now used for coins of small value, to make change, the two latter, commonly designated "the precious metals," as measures of value and legal tender. On the continent of Europe a composition of silver and copper, called bullion, has long been used for small coins; which are made current at a much higher value than that of the metals they contain. In China, St. Sysee silver is the principal currency, which is merely ingot silver of a uniform fineness, paid and received by weight.

Spanish and Mexican dollars also circulate there, but only after they have been assayed and stamped as proof that they are of the standard fineness. As Asia Minor produced gold, its earliest coinage was of that metal. Italy and Sicily possessing copper, bronze was first coined there.

The Lydians had gold coins at the close of the ninth century B. C.; Greece proper only at the close of the eighth century B. C. Servius Tullius, King of Rome, made the pound weight of copper current money.

The Romans first coined silver 281 B. C., and gold 207 B. C. Some nations, although they worked the metals with skill, seem never to have coined money, and such was the case with the Irish, of whom no coins are known prior to the English invasion in the twelfth century.

The amount of specie existing in Europe, A. D. 14, was equal in value to but £358.

After the Augustan era the product of the European mines failed, and the stock of coin gradually disappeared until the ninth century, each step of its fall being marked by the greater poverty and social degradation of the people, until at last such was the scarcity of coin, *human beings* in Britain were made a legal tender at specified rates.

This dearth of the precious metals contributed largely toward establishing the dark ages. Out of these depths arose the great modern institutions — the mercantile theory and credit — the one a palliative and the other a cure. No increase in the stock of coin occurred until after the discovery of America, but the invention of paper credit largely alleviated the prevailing misery. This invention is due to the Jews, who, in 1160, introduced bills of exchange, and who were the only persons, from the institution of the canon law against the taking of interest for

the loans of money to the sixteenth century, who, in Western Europe, durst make a business of giving credit.

The same people established the first banks in Europe. That of Venice was established in 1157, that of Geneva in 1345, that of Barcelona in 1401, and that of Genoa in 1407. The discovery of America in 1492, produced no immediate increase in the European stock of coin. The mines of Potosi were opened in 1545, but it was not until near the seventeenth century that the stock of coin sensibly increased. The taking of interest was totally forbidden in England until 1571, and the device of extending credit by means of indorsement was not practiced until a century later, when it was introduced from Holland.

The stock of coin steadily increased until 1827, when it reached its highest point, and then declined until the opening of the Pacific coast mines in 1848, when it again increased, passing in 1860 its greatest previous hight, and obtaining in 1867 the enormous sum of four thousand six hundred millions of dollars.

Copper coins, few in number, were used by the Mint of the United States as early as 1792; but these are now so rare that one of them sold at auction in Philadelphia, in January, 1860, for sixty-five dollars and fifty cents, and another for fifty dollars. The Mint did not get fairly into operation until 1793, when the first copper cent appeared.

The estimated amount of gold in existence at the commencement of the Christian era was $427,000,000. At the discovery of America, in 1492, this amount had diminished to $57,000,000. In 1600 the amount had risen to $105,000,000; in 1700 to $351,000,000; in 1800 to $1,251,000,000. The Russian mines extending over one-third of the surface of the globe, on parallel fifty degrees north latitude, were discovered in 1819.

In 1843, the estimated amount of gold in existence was $2,000,000,000.

Next followed the discoveries in California, February 9th, 1848, and in Australia, February 12th, 1851, which added enormously to the gold production. In 1853, the amount in existence was computed at $3,000,000,000; and in 1860 it was $4,000,000,000.

From the commencement of the Christian era to the discovery of America, it was estimated that gold had been taken from the surface and mined to the amount of $3,800,000,000.

In the reign of Darius gold was thirteen times more valuable, weight for weight, than silver. In the time of Plato it was twelve times as valuable. In that of Julius Cæsar gold was only nine times more valuable, owing, perhaps to the enormous quantities of gold seized by him in his wars.

MAHOGANY CUTTING IN HONDURAS.

Of all occupations known to man, that of the mahogany cutter is perhaps the wildest in its nature, and yet among the most systematic in its arrangements. When the cutter has fixed on the valley of some river as the field of his operations, he makes a depot for storing provisions, and for securing and embarking the wood. Here he maintains a little fleet of pitpans for carrying supplies and keeping up relations with the "works" proper, the sites of which are determined chiefly by the abundance of trees, their accessibility, and the means that exist for feeding the cattle which it is necessary to use in "trucking" the wood. To those points it is often necessary

to drive the oxen through thick and untracked forests, and to carry the chains and trucks, by means of small boats, against strong currents, or over the shallows and rapids, which are only surmounted with infinite labor. The site once definitely fixed upon, the next step is to erect temporary dwellings for the men — a task of no great difficulty, as the only requisite is protection from the sun and rains, which is effected by a roof thatched with long grass from the swamps, or with "cahoon" leaves, or the branches of the thatch-palm. A hammock swung between two posts, two stones to support his kettle, and the hut of the cutter is both finished and furnished!

The mahogany season, which lasts some months, commences in August of each year, it being the opinion of cutters that the wood is not then so apt to split in falling, nor so likely to "check" in seasoning, as when cut from April to August, in what is called "the spring." Furthermore, by commencing at this period, the cutter is enabled to get down his wood and prepare it for trucking by the setting in of the dry season.

The laborers are divided into gangs, or companies, of from twenty to fifty each, under the direction of a leader styled a "captain," who directs the men in his company, assigns them their daily tasks, and adds to or deducts from their wages, in proportion as they accomplish more or less than what is supposed to be a just day's work. Each gang has also one person connected with it who is called a hunter, whose duty it is to search the "bush" for trees proper to be cut. His work, therefore, commences somewhat earlier than that of the others, and as it involves activity and intelligence, he is paid much higher wages than the mere cutters. His first movement is to cut his way through the thickest of the woods to some elevated situation, where he climbs the tallest trees he finds, from which he minutely surveys the surrounding country.

Around Belize the mahogany cutters are chiefly negroes, descendants of the slaves who were formerly employed there. But in Honduras they are principally Caribs, who, in activity and strength, are said to excel the negroes; they are also more intelligent, and require less care and superintendence. Many of them go annually to Belize, and hire themselves for the season, returning to their homes at its close.

CUTTING PRECIOUS STONES.

Carnelian is the substance that has been selected as the example of the mode of cutting and polishing stones of a medium degree of hardness, the two other examples being alabaster for the softest stones, and sapphire for hardest, excepting alone the diamond, which last is worked by a manner peculiar to itself, and separately considered.

Carnelian, when operated upon by the lapidary, is first slit with the thin iron slicer, fed with diamond dust, and moistened with brick oil; secondly, it is rough ground on the lead mill, with coarse emery and water; and, thirdly, it is smoothed either on the same lap rubbed down fine, or with similar lap used with finer emery; thus far, the steps are precisely as explained with alabaster.

Carnelian, and sometimes stones of a similar or superior hardness, which are not smaller than about one-third of an inch in diameter, are, in almost all cases, polished on a lead mill plen-

tifully supplied with rotten stone and water; but this fine powder will scarcely adhere after the manner of the coarser and granular emery, or by simple pressure; and, therefore, to expedite the process, the face of the polishing lap is *hacked* or *jarred,* although in a manner quite different from that pursued by the cutler.

The lapidary employs the blade of an old table knife, which he holds slenderly between the thumb and finger, placed near the middle of the blade, while the front part of the edge rests on the lap, not perpendicularly, but slanted a little forwards, so as to meet the lap edge foremost during its revolution. The unstable position of the knife causes it to jump, vibrate, or chatter on the lap, and at each jump it makes a very slight furrow; these fill the face of the mill with minute lines, or grooves, that serve for the lodgement of the finely powdered rotten stone. It is, however, to be observed that the wheel should first be made to revolve in the one direction and then in the opposite, that the marks of the hacking knife may cross each other.

Smaller and harder stones are more commonly polished on a pewter than a lead lap, and for the smallest and hardest stones a copper lap is preferred; but all the polishing tools, of what metal soever they may be made, are hacked as above described, and used with rotten stone and water.

Rounded or convex stones, or those said to be *en cabochon*, whether of carnelian or even several of the harder stones, are in many cases successively wrought by means of the wood mill with fine emery, the list mill with pumice stone, and a leather lap with putty powder. This is done on account of the greater elasticity of these apparatuses, which enables them to ply more conveniently to the globular forms of the works to be polished, and avoid wearing them in ridges or flat places.

Faceted works, on all stone and hard substances, are for the most part cut by the lapidary after one of three different modes. First, for pastes, or artificial stones, and many soft stones, as amber, carnelian, jet, etc., the facets are usually cut on a lead wheel with emery, and polished on pewter with rotten stone. Secondly, for some of a harder kind, but inferior in hardness to sapphires, the succession of tools is a pewter lap and fine emery for the cutting, and a copper lap with rotten stone for the polishing. Thirdly, for sapphires, the chrysoberyl, and rarely for some few others likewise, a copper lap with diamond powder is used for cutting the facets, and a copper lap with rotten stone for polishing them. And fourthly, with the diamond, two stones are rubbed in a peculiar manner the one against the other to cut the facets, and they are polished by means of the *drop*, and an *iron* lap, or *skive*, fed with diamond powder.

From the comparatively small size of the stones and gems that are cut into facets, they cannot generally be held unassistedly in the fingers; the stone is consequently cemented centrally upon the end of a round piece of wood, nearly like a drawing pencil. The stick, when held *vertically*, gives the position for grinding the central facet or *table* of the stone; the stick is inclined to a certain angle for the eight, twelve or more facets, contiguous to the table; of which facets, two, three, or four series are commonly required at different inclinations; and lastly, the *horizontal* position of the stick serves in cutting the girdle or

central band around the exterior edge of the stones.

The several inclinations of the stick on which the stone is cemented, are easily determined by placing the upper end of the stick into one of several holes in a vertical post, fixed alongside the lap, and this retains the inclination very accurately and simply.

CHOOSING WALL PAPER.

Most persons when they go into a store to purchase paper for the walls of their houses, are never satisfied unless they overhaul a great number of patterns. Their object is to secure the *prettiest* style they can find — the best among the lot — and this course, in ordinary business, has a common sense appearance about it. But a rule of conduct, excellent and correct in the pursuit of one object, may be totally wrong in following after that of another, and this is the case in examining a great number of samples of printed paper at once. Many are so liable to get bewildered when a great variety of patterns are passed before them, that they frequently choose the poorest design of the lot. This is not surprising; indeed it is in exact accordance with the laws of vision.

It has been conclusively shown by M. Chevreul, the distinguished chemist in Paris, that the eye, in looking at color after color, is gradually undergoing change, so that the character of each color is altered; in short, the color is vitiated. An analogous result is unquestionably produced in the form of the patterns, as well as in their colors and proportions. The best way to select good and agreeable patterns of paper, therefore, is to examine only a few at once.

BUTTER COOLER.

Melted butter is all very well in its right place, but when butter is put upon the tea or breakfast table, having the appearance of being just out of the oven, it is anything but creditable to the housekeeper, and far from satisfactory to those who eat it. Dry toast is positively spoilt if spread with soft butter; indeed, if butter cannot be brought to table at least firm, if not hard, it is better to keep it away altogether. Fortunately, however, it is not necessary to proceed to such desperate measures, as butter can be kept nice and cool in the hottest weather, and that in a very simple manner. Procure a large, new flower pot of sufficient size to cover the butter plate, and also a saucer large enough for the flower pot to rest in upside down; place a trivet or meat stand (such as is sent to the oven when a joint is baked) in a saucer, and put on this trivet a plate of butter; now fill the saucer with water, and turn the flower pot over the butter, so that its bottom edge will be below the water. The hole in the flower pot must be fitted with a cork; the butter will then be in what we may call an air-tight chamber. Let the whole of the outside of the flower pot be thoroughly drenched with water, and place it in as cool a spot as you can. If this be done over night, the butter will be as "firm as a rock" at breakfast time; or, if placed there in the morning, the butter will be quite hard for use at tea hour. The reason of this is, that when water evaporates, it produces cold; the porous pot draws up the water, which in warm weather quickly evaporates from the sides, and as no warm air can get at the butter, it becomes firm and cool in the hottest day.

PLUMBAGO MINES ---- LEAD PENCILS.

Every one knows what a black lead pencil is, but it is not generally known that there is not a particle of lead in the pencil. The material variously known as black lead, graphite or plumbago, is almost wholly composed of carbon. It probably owes its misnomer to the fact that previous to the employment of graphite for making pencils, common lead was used, and this within the present century. For a long time the best graphite was obtained, not in very large quantities, at Borrowdale, in the English county of Cumberland, where it was discovered in 1564, early in the reign of Queen Elizabeth, and pencils, much like those still in general use, were produced in the year following. As the supply of the graphite (known in Cumberland, while in the mine, by the title of wad), was not large, the British government, from the first, took great pains to prevent the exportation of the article, and even to limit its home sale to a supply just sufficient to meet the estimated demand. Graphite is found in various parts of Europe, and even in North America, but of very inferior quality. The Cumberland mines were worked only a few weeks in each year, yet the yield of wad was estimated at £40,000 a year. While the graphite lasted, England had a monopoly in supplying the best pencils to the world. Year after year, for a century past the graphite deposit in Cumberland became "fine by degrees and gradually less." The result was that graphite powder had to be compressed into a solid cake from which pencils could be supplied. A French variation, said to be an improvement, was to mix the powdered and purified graphite with clay, which is largely done still.

Nearly one hundred and fifty years ago, the pencil manufacture commenced in England, and improved in France, was transplanted to the village of Stein, near Nuremberg, in Bavaria, and, little more than a century since, Casper Faber there began to make the pencils which continue to be made by his descendants, and bear the family name through the world. The present John Lothair Faber, great grandson of Casper, has been head of the firm since 1839, and is not only very wealthy, but has recently been ennobled by the king of Bavaria. One of his brothers is associated with him at Stein, in the processes of manufacture; the youngest of the three, Eberhard Faber, represents the firm, for the Western World, at New York. Stein is literally a town of pencil factories, of which Baron Faber is the ruler, taking care of the health, government, education, industry, thrift, and amusements of the inhabitants, and always living in their midst. It may be asked—how do the Fabers make lead pencils without the famous graphite from Cumberland? It appears that twenty years ago John Peter Alibert, a Frenchman, resident in Asiatic Siberia, having heard of the gold discoveries in California, began to examine the sandy beds of various rivers flowing into the Arctic Ocean. He found samples of pure graphite, evidently brought a considerable distance by force of the stream, in one of the mountain gorges near Irkurtsk, and pursuing his discovery tracked back to a branch of the Salan Mountain range, on the very summit of Mount Batougal, 275 miles west of the town of Irkurtsk, near the Chinese frontier, in the midst of the rocky desert, and found pure graphite. After years of costly labor Alibert found an exhaustless deposit of graphite equal

to the best ever taken from Cumberland. Besides decorating and rewarding him, the Russian government changed the name of Mount Batougol to that of Mount Alibert. Nearly every crowned head in Europe has honored him. With the consent of the Russian government, Alibert now supplies Faber's house exclusively with graphite from the mine in Asiatic Siberia. Pencils of this material were first made by Baron Faber in 1861, and were not introduced into the American market until 1865, from which time artists and others perceived and acknowledged their superiority. If the world were to endure a thousand years more, there is sufficient graphite in Mount Alibert to supply its population with good black lead pencils.—

CLOTHES ON FIRE.

Three persons out of four would rush right up to the burning individual and begin to paw with their hands without any definite aim. It is useless to tell the victim to do this or that or call for water. In fact, it is generally best not to say a word, but to seize a blanket from the bed or any woolen fabric—if none is at hand take any woolen material—hold the corners as far apart as you can, stretch them out higher than your head, and running boldly to the person make a motion of clasping in the arms, mostly about the shoulder. This instantly smothers the fire and saves the face. The next instant throw the person on the floor. This is an additional safety to the face and breath, and any remnant of flame can be put out more leisurely. The next instant immerse the burnt part in cold water, and all pain will cease with the rapidity of lightning. Next get some common flour, remove the water, and cover the burnt parts with an inch in thickness of flour; if possible put the patient to bed, and do all that is possible to soothe until the physician arrives. Let the flour remain until it falls off of itself, when a beautiful new skin can be f .d. Unless the burns are deep no other applications are needed. The dry flour for burns is the most admirable remedy ever proposed, and the information ought to be imparted to all. The principle of its action is, that like the water it causes instant and perfect relief from pain by totally excluding all the air from the injured parts.—*Scientific American.*

AUGER.

It is supposed that the first boring-tool was an awl of some kind. Pliny says that the gimlet was invented by Dædalas, 1240 B. C. It may have had a hollow pod and a cross-head form of handle, but was without a screw point. Awls have been found in Egyptian tombs showing them to have been in use 1490 B. C. The auger with the twisted shank which makes itself discharging, was like many other important inventions and discoveries, the result of an accident. The screw auger is an American invention dating back to the year 1774, when John White and Benjamin Brooke, of Hammer Hollow Valley Forge, Pennsylvania, noticed some boys boring holes in the ground with hoop iron. One of these becoming accidently twisted, the men noticed that as it turned the loose dirt was drawn up. Thinking it possible that a tool for boring wood might be constructed on the same principle, it was immediately tried with the addition of a screw point for drawing the cutting edge into the wood. The ex-

periment proved eminently successful and led to the manufacture of large numbers of these augers. The oldest auger factory in the United States is that of Job T. Pugh, of Philadelphia, Penn., and was started over one hundred years ago. The first Pugh connected with the business was an apprentice to Benjamin Brooke, one of the original inventors, and in 1790 they formed a partnership under the firm name of Brooke & Pugh. The business since that time has remained in the hands of successive generations of the family. There are also many other large manufactories which have achieved a lasting reputation in making augers and bits, suitable for boring in all kinds of wood, also an endless variety of what are called earth-boring augers, all claiming some superior advantage over the others.

SAFFRON.

This drug is of considerable importance to the *materia medica*, and is extensively cultivated in France and other countries. The true Saffron is a bulbous plant of the genus crocus, bearing flowers of a deep yellow color. It is also used by dyers, but not to the same extent as the safflower—also called bastard saffron. The latter is an annual of the genus carthamus, having a deep red fecula separated from orange-colored flowers. It is the base of what is known to dyers as Spanish red and China lake.

In France entire fields are devoted to the cultivation of saffron; but the industry is chiefly confined to three Departments of the country, of which Loiret produces the best quality and largest amount.

A saffron field is not in full bearing until the end of the second year, and as it is a very exhaustive crop, at the end of three years the land is in a very bad condition for future tillage. The average crop of the second and third years varies from ten to thirty kilograms per hectare, or from nine to twenty-seven pounds per acre of dry pistils. Each acre produces from six to seven hundred thousand bulbs, and each bulb two or three flowers. About thirty thousand flowers are required to produce two pounds of fresh pistils, but when dried they are reduced to one-fifth of that weight. The pistils are the only portion of the flower used; the rest is waste.

The labor of picking these flowers is very great, and when the crop is abundant frequently engages a large number of hands to have it properly secured. Farmers pay from 10d. to 4s. a pound for the picking, as the abundance of the crop or the necessities of the agriculturists may require. Saffron sells all the way from two to five dollars per ℔. The latter price, however, is unusual in ordinary years, and only the finest will command such rates.

When the pistils are separated from the rest of the flower they are dried by placing a small quantity in a horse-hair sieve over a portable charcoal furnace, and this operation is repeated until the whole product is ready for market.

It is bought up for exportation by buyers from Germany and other countries, and after it has passed into second hands is often adulterated by an admixture with foreign substances. This is frequently so skillfully performed as almost to defy detection except by chemical examination. A recent case came up for investigation. A quantity of what was sold for "Ger-

man Saffron," by a wholesale druggist, proved to be shreds of Campeachy logwood and fustic, ingeniously blended together by being moistened with a small quantity of heavy syrup. The deception was so perfect that an experienced retailer bought the mixture and sold it for the genuine article.

In medical practice the flowers and root of saffron are used as a stimulant and anti-spasmodic.

ANCIENT ARTILLERY.

It is curious that the dates of the two great discoveries of modern times — printing and gunpowder — should be involved in uncertainty, as well as the names of their respective discoverers. To Bartholdus Schwartz is popularly ascribed the discovery of gunpowder in the year 1320, though Roger Bacon in his "Magnum Opus," in 1270, mentions its ingredients, and how it might be used for propelling projectiles; while he acquired his information from a manuscript of Marcus Græcus, the date of which is unknown, being somewhat vaguely ascribed to some time between the ninth and twelfth centuries. Indeed gunpowder is supposed to have been known at a much earlier date, some writers even stating that it was in use among the Eastern nations as far back as 355 years before Christ. Some authors, again, would connect gunpowder with Greek fire, which has been known in the East from time immemorial, and which is said to have been introduced into Europe in 673 at the siege of Constantinople, and that it was not till the mixture of its ingredients was better known that it was used for propelling projectiles. When it was first used in Europe for that purpose is likewise uncertain. To the Moors in Spain is generally ascribed the introduction of artillery in Europe. According to Conde it was used by them at the siege of Saragossa in 1118 — 150 years before Roger Bacon's reputed discovery. In 1306 — 1308, Gibraltar was lost to the Moors through the artillery of the besiegers; and when Alphonso the Eleventh of Castile, in 1343, besieged the town of Algesiras, the Moorish garrison threw "thunderbolts" among their enemies from long mortars or troughs of iron. Jean Villani states that the English had guns at the battle of Crecy in 1346, but this is not confirmed by Froissart or other historians of the battle; while John Barbour, Archdeacon of Aberdeen, in his account of Edward the Third's first expedition against the Scots in 1327, mentions that with the royal army were "crakys of war," which are supposed to have been cannon. However doubtful may be the date of their first introduction into Europe, it is certain that they had not come generally into use as instruments of warfare till the latter part of the fourteenth century, which may account for the statement of some authors that guns were first used by the Venetians against the Genoese in 1378.

As may be supposed, they were at first of very rough construction, and were called bombardes, from the word *bombas,* indicative of the noise made in their discharge. They were made either of hammered iron, or iron bars soldered and welded together and strengthened with iron hoops; or sometimes of iron and copper plates, with lead run between them, and covered with wood or hides. They were wider at the mouth than at the chamber, and were mostly of ponderous size and of very great length. Froissart

gives an account of a great gun used by Philip Von Artaveld at the siege of Oudenarde in 1382. "They had also, the more to alarm the garrison, fired a bombarde of a very great size, which was fifty feet in length, and shot stones of an immense weight. When they fired off this bombarde, it might be heard five leagues off in the daytime and ten at night;" a statement which is of course open to doubt in slightly skeptical minds.

The balls were of stone, and, as Froissart says, were often of "immense weight." Those fired by the famous brass cannon of Mahomet the Second, used at the siege of Constantinople in 1443, weighed six hundred pounds. Though the walls of a town or fortress were then not built to resist artillery, yet the effects of these great masses hurled against them were not so great as might be supposed. The unwieldy size of the guns made them difficult to work, and their weight rendered them almost immovable. From these circumstances some great bombardes acquired the name of "bourgeoise," from their constant residence in one place. Even when the difficulties of transport had been overcome, the damage done by one discharge was easily repaired before another had time to enlarge the breach. The bombardes used by the Venetians at the siege of Chiozza, in 1380, were fired only *once* in twenty-four hours. They were loaded under cover of the night, to be ready to discharge in the day-time. Mahomet's cannon, above mentioned, though nearly a century afterwards, was fired but seven times a day, and for its transport required a carriage of thirty wagons linked together and drawn by sixty oxen. with two hundred men on each side to support it and assist its progress; while it took two months to convey it one hundred and fifty miles.

It may thus be easily understood that a siege was not so formidable an affair as it afterwards became. It was not till the latter part of the fifteenth century that the old bombardes were replaced by brass guns of a somewhat lighter description and the stone changed for metal balls. The French and Germans—the former especially—excelled in their ordnance, both in its construction and improvement, and in the working of the pieces. To Charles the Eighth of France belongs the credit of the first organized system of artillery. On his expedition to Naples, in 1494, he had a train of ordnance consisting of bronzed cannon of about eight feet in length, and many smaller pieces. They were drawn by horses, and from their lightness were easily transported.

Bombs came from Germany, but at what date is uncertain. According to one author—Valturinus—they were invented about 1538; while Strada says that they were first used in 1588, at the siege of Vakterdone, in Guelders, and were invented by an inhabitant of Nenlo, a maker of fireworks. When the first trial of them was made at Venlo, a shell burst through a house, and so effectually set it on fire that the conflagration was not extinguished until one-half the town had been burnt.

The howitzer—a smaller kind of mortar mounted on a carriage—also came from Germany in 1593 or 1594. That which distinguishes it from a mortar is, that the trunnions, or knobs, by which it is fastened to the stand, are in the middle, while those of the mortar are at the end of the piece.

On particular emergencies guns are said to have been made of jacked

leather; but it is more probable that the outsides only were of that material, like the cannons of boiled leather of Gustavus Adolphus, which, from their lightness—they were drawn easily by two men—mainly contributed to his victory at Leipsic. A coating of leather, boiled and varnished, was spread over the copper tubes.

From the terror they inspired, and from their deadly and quick movements, fanciful and often appropriate names of serpents and birds of prey were given to great guns. Lady Percy tells Hotspur that he talks in his sleep of "basilisks, of cannon, culverin;" the last is a corruption of colouverine—a hawk. There were likewise falcons and falconets, minions and sakers.

Chambered pieces, loaded at the breach, for throwing stones principally, were known by the name of cannon, perriers, or pattereros. They were sometimes mounted, two at a time, on carriages called spingards. There were also similar but smaller pieces, used mostly on shipboard, called portpieces, stock fowlers, slingpieces, portingale bases, and when employed in towers pierced with loopholes, they received the appropriate name of "murtherers.'

REMOVAL OF DRY PUTTY.

According to an English journal, the difficulty of removing hard putty from a window sash can be obviated with great readiness by simply applying a piece of heated metal, such as a soldering-iron or other similar implement. When heated (but not red-hot) the iron is to be passed slowly over the putty, thereby rendering the latter so soft that it will part from the wood without any trouble.

SIGNING THE DECLARATION.

Mr. Jefferson used to relate, with much merriment, that the final signing of the Declaration of Independence was hastened by an absurdly trivial cause. Near the hall in which the debates were then held was a livery stable from which swarms of flies came into the open windows and assailed the silk-stockinged legs of the honorable members. Handkerchief in hand, they lashed the flies with such vigor as they could command on a July afternoon; but the annoyance became at length so extreme as to render them impatient at delay, and they made haste to bring the momentous business to a conclusion. After such a long and severe strain upon their minds, members seem to have indulged in many jocular observations as they stood around the table. Tradition has it that when John Hancock affixed his magnificent signature to the paper, he said: "There, John Bull may read my name without spectacles!" Tradition, also, will never relinquish the pleasure of repeating that, when Mr. Hancock reminded the members of the necessity of hanging together, Dr. Franklin was ready with his "Yes, we must indeed all hang together, or else, most assuredly, we shall all hang separately." And this may have suggested to the portly Harrison—"a luxurious, heavy gentleman," as John Adams described him—his remark to slender Eldridge Gerry, that when the hanging came he should have the advantage, for poor Gerry would be kicking in the air long after it was all over with himself. French critics censure Shakespeare for mixing buffoonery with scenes of the deepest tragic interest. But here we find one of the most important assemblies ever convened, at

the supreme moment of its existence, while performing the act which gives it its rank among deliberate bodies, cracking jokes, and hurrying up to the table to sign, in order to get away from the flies. It is precisely so that Shakespeare would have imagined the scene.—*James Parton.*

MOSAIC AND ENAMEL.

Mosaic is a kind of inlay, producing a picture or pattern by the due selection of colors in the pieces employed. The substance may be wood, stone, marble, porcelain, terra-cotta, enamel or colored glass, and it may be cut into cubes, hexagons, triangles or various other forms; the chief conditions being that the pieces should be small in size, variously colored and placed in such juxtaposition as to bring the proper tints into the proper places. The marble pavement under the dome of St. Paul's, the wooden flooring and paneling done in marquetry, the inlaying of cabinet work known by the names of marquetry and buhl work, the intricate patterns of Tunbridge ware toys, the nicely fitting lids of Scotch snuff boxes—all are examples of mosaic so far as the principle is concerned; but it is generally meant, in art, that a mosaic is a picture, which must have the mind of an artist thrown into it before the mechanical working begins.

Enamel is really nothing more than opaque glass, the opacity being produced by the addition of some one or more among many metallic oxides to the other ingredients. According to the color required, so is the metallic element chosen—lead or antimony to produce yellow, iron to produce red, gold for a more intense and beautiful red, copper for green, cobalt for blue, and various combinations for other colors. Enamel paintings are plates of copper, silver or gold, on which the picture is produced by using the enamel in the form of paint, and then vitrifying it by the heat of an oven.

Enameled watch dials have a thin coating of white enamel on a copper disk or plate, while the figures and spots are painted in black enamel, vitrified by heat.

Now the use of enamel for mosaic is simply the substitution of cubes or small pieces of colored enamel for pieces of other substances. They are occasionally employed, like colored glass, with a part of the effect due to semi-transparency; but more frequently they are quite opaque, only to be looked at by reflected light. The beautiful Pompeiian mosaic of the "Battle of Issus" is of enamel. The mosaics of St. Peter's are also of enamel. So numerous are the gradations of tint necessary to produce all the lights and shades of an elaborate picture, that the mosaic workshops at the Vatican are said to contain no less than twenty thousand varieties, all methodically sorted and arranged. Some of the larger and more ambitious works have taken ten, fifteen, or even twenty years to execute. The durability of the material is fully as great as that of stone itself, insomuch that the mosaic pictures of St. Peter's, so far as atmospheric and climatic influences are concerned, may possibly last as long as the structures which they adorn. The mode of proceeding is pretty much as follows: A ground or support is prepared, either a metal plate or a slab of travertine, the proper size and shape of the picture, and this is surrounded with a raised rim of iron. Into the recess thus formed is introduced a cement or stucco mixed to a

pasty state, and consisting of pounded travertine, carbon of lime, mastic and linseed oil. The tesseræ, cubes or small pieces of enamel (some barely larger than a pin's head) are selected of the proper colors, tints and shades, and imbedded one by one in the cement. Only so much cement is laid in as can be filled with tesseræ in one day, in order that it may retain sufficient softness. It eventually hardens to the consistence of stone. When the whole picture is finished, the surface is rubbed smooth and made dull or polished according to the kind of effect intended to be produced.

HOW ELECTROTYPES ARE MADE.

Conflicting statements have been made in regard to the originators of the process of manufacturing electrotype plates for printing. It is alleged that the discoveries which led directly to it were made, about the same period, a short time before 1840, by Professor Jacobi, of St. Petersburg, Russia, by Thomas Spencer, of Liverpool, and by J. C. Jordan, of London. Joseph A. Adams, a wood-engraver of New York, also commenced experiments in electrotyping plates from wood-cuts in 1839, and produced a plate which was printed from in Mapes' Magazine in 1841. Some one of the best of English authorities on Electro-Metallurgy and Electrotyping, says that, so far as he knows, the London Journal for April, 1840, contained the first specimen of printing from an electrotype, by Newton, and that it was a small, rough sketch.

The galvanic battery, as improved and enlarged in its scope by Volta in 1800, furnishes the base of the art of electrotyping. Various improvements in the form and materials of batteries have been made, but all batteries are constructed on the principles laid down by Volta.

In preparing a form for electrotyping, the books say that type-high spaces and quadrats must be used; but this is not absolutely necessary, and in practice low spaces and low quadrats are often employed. The form, however should be accurately justified, tightly locked up, and well protected on all sides by high slugs or type-high bearers. The first process of the electrotyper, after seeing that a type-high form or engraving is perfectly clean, is to cover it with a finely powdered black-lead or plumbago, and to subsequently remove all excess of black-lead, by rubbing the palm of the hand over the surface of the type or wood-cut. This is done to facilitate the withdrawal of the form from the mould. The moulding composition is made of the best unadulterated yellow wax, to which, in cold rooms or cold weather, from five to twenty per cent. of virgin wax is added. The wax is boiled, to prepare it for use, and then poured into a moulding-case, which is a flat brass pan. The form to be electrotyped being placed on the bed of an electrotyper's press, the wax in the moulding-case is placed upon the face of the form, and an impression taken.

After this impression is taken and the form and mould are separated, the mould next goes through the process of building, which consists in dropping heated wax upon such portions as should be deeply sunk in the finished electrotype plate. Where there is a large body of quadrats, for instance, in a form, the corresponding part of the mould should be raised by a deposit of melted wax. Great skill is displayed by some electrotypers in building. They use a heated building-iron, or

piece of iron shaped something like a poker, of convenient length, with a sharp point, which is applied to a strip of dry wax until some of the wax adheres to it; this wax is dropped, in a melted state, upon the portions of the mould which are to be raised; and it requires a steady hand to drop the melted wax exactly where it is needed, and to avoid dropping it upon any spot where it is not needed. After the building process is completed, the wax mould is next black-leaded,—very pure, fine, and lustrous black-lead being required for this purpose. It is also necessary that the entire surface of the mould should be very effectually covered with this substance, to insure a perfect deposit of the copper; and, to facilitate this operation, a black-leading machine is used.

After the mould is black-leaded, every particle of superfluous black-lead is removed by blowing it off, with a pair of bellows having a broad nozzle. The mould undergoes a further preparation, by having the back of the moulding-pan coated with wax, so that copper will not be deposited upon it, and also by attaching to a point near the face of the mould a bit of metal, or adopting some similar method for hastening the deposit of the copper on the black-leaded surface. It is then quickly immersed in one of the apartments of the battery, where the process of dropping a copper solution upon the black leaded surface of the mould is continued until a solid surface is formed, which, though it is scarcely thicker than a man's thumb-nail, forms, when properly backed, the best and most enduring surface for letter-press printing that has ever been discovered. The battery itself is one of the marvels of modern science, being an offshoot of a long series of attempts to utilize discoveries appertaining to the mysterious domain of electricity. It will suffice here to say that in one of the chambers of the battery an acid bath is made of sulphuric acid dissolved in water; this solution is acted upon by zinc plates and other appliances; and a connection akin to the wonders of the telegraph is made by wires or rods, or both, with the chambers in which the forms are deposited, and with the form itself,—the result of all these and auxilliary processes being that copper, after its reduction to a liquid, is subsequently concentrated in a shape and consistency adapted to the printer's use.

After the shell, as it is technically termed, is formed in the battery, it must next be carefully removed from the mould, and all wax taken from it. This is done by pouring hot water gently over the mould, or by placing it in a steam-heating table, and superfluous wax is removed by a heated solution of common potash. The other processes consist of trimming the shell, or soldering to it tin, and subsequently straightening, backing, shaving and finishing it. Tin adheres readily to copper; a backing metal composed of four parts of tin, five of antimony, and ninety-one of lead adheres readily to tin; and by a combination of these metals, the thin electrotype shell is thickened to the extent requisite for use as a plate.

A GOOD WAY to destroy moths is to take a coarse crash towel and wring it out of clean water. Spread it smoothly on the carpet, then iron it dry with a hot iron, repeating the operation on all suspected places, and those least used.

FIRE-ALARM BELLS.

The use of bells to sound alarms in case of danger from floods and other impending dangers is of very ancient origin. It is said that in the year 610, when Sens was besieged, the Bishop of Orleans ordered the bells of St. Stephen to be rung, and the sound so frightened the assailants that they abandoned the siege. When Macbeth shut himself in the fortress of Dunsinnane, and it was announced than Birnam Wood was moving on the castle, he cried out in his desperation,—

"Ring the alarum bell! Blow wind! Come wreck!
At least we'll die with harness on our back."

In later years the use of bells has become so systemized as not only to sound the alarm of fire, but to indicate the locality of the danger, and there are several cities in the United States, in which, by means of electricity, every fire bell may at once announce this fact.

TO MAKE COURT PLASTER.

Soak isinglass in a little warm water for twenty-four hours; then evaporate nearly all the water by a gentle heat, dissolve the residue in a little proof spirits of wine, and strain the whole through a piece of open linen. The strained mass should be a stiff jelly when cool. Now, extend a piece of silk on a wooden frame, and fix it tight with tacks and pack thread. Melt the jelly and apply it to the silk thinly with a hair brush. A second coating must be applied when the first has dried. When both are dry, cover the whole surface with two or three coatings of the Balsam of Peru, applied in the same way. Plaster thus made is very pliable and never breaks.

CURE FOR NEURALGIA.

The following cure for neuralgia is given by the Newark *Gazette*: "A friend who suffered horribly from neuralgia, hearing of a noted physician in Germany who invariably cured the disease, crossed the ocean and visited Germany for treatment. He was permanently cured after a short sojourn, and the doctor freely gave him the simple remedy used, which was nothing but poultice and tea made from our common field thistle. The leaves are macerated and used on the parts afflicted, as a poultice, while a small quantity of the leaves are boiled down to a pint, and a small wine glass of the decoction drank before each meal. Our friend says he has never known it to fail of giving relief, while in almost every case it has effected a cure."

SPECTACLES.

Spectacles are said to be of Asiatic origin, and are of great antiquity in China. Roger Bacon, who was born at Ilchester, in Somersetshire, in 1214, writes: This instrument, a plano-convex glass or large segment of a sphere, is useful to old men and to those who have weak eyes, for they may see the smallest letters sufficiently magnified. It is also claimed that Alexander de Spina, a monk of Pisa, who died in 1313, was the inventor, but it is believed to be anticipated by this date of Bacon's. In 1463, John Buret, of Burg, St. Edmunds, left by will to one of the monks, his ivory tablets and a pair of silver-gilt spectacles. Also in the fifteenth century, from the tapistry of Nancy, is represented a scribe with spectacles on nose and all the apparatus for writing.

THE SODA LAKES OF MEXICO.

The soda lakes of Mexico, from the waters of which crude soda is largely manufactured, are among the natural sources of wealth to the country. The lake of Tescoco, a short distance from the capital of Mexico, and communicating with the city by means of a canal, is one of the greatest natural curiosities of that country. In the center is a barren island, with a hill composed of volcanic rock, and known as El Penon de los Bancos, or rock of the baths, rising from the surface. This desolate spot is famous for the manufacture of crude soda, or tequesquite, a manufacture not more remarkable for its primitive method than its vast resources. The earth of the valley is impregnated with a species of soda, and Lake Tescoco itself is a concentrated solution of soda. It contains an immense amount of the salts of sodium, chiefly the chloride of sodium and the carbonate of soda. The lake has great surface and small depth, and with a rainy season of four months and a dry season of eight, its range of expansion and contraction is 220 square miles at its maximum to 80 square miles at its minimum. A calculation of the contents of the lake was made in 1851, when the lake was considerably contracted, and the proportion of solid matter was ascertained to be not less than 18 per cent. The Penon soda stills are not numerous, but illustrate the rude principle at work all around the lake. They are simply mounds of accumulated dark, bluish mold, on which large round holes are made here and there. In these holes bags are placed, and in the bag the impregnated, frosty-looking earth found every morning along the lake. Over this earth water is poured, and the liquor which sinks through the dirt, and is drained from the bag, passes into a vessel below. The solution thus caught is evaporated over a fire, and tequesquite is the result. This is the whole process, which is the same that was used in the days of Montezuma. With this primitive system of manufacture, the lake, according to the estimates of the School of Mining in the city of Mexico, produces annually 1,680,000 pounds of crystallized or pure soda, and 3,696,000 pounds of tequesquite or impure soda.

THE BANYAN TREE.

The Banyan (*Ficus Indica*) is indigenous to India only. I call it one of the "kings of the forest," because no other of the vegetable giants ever measured a tithe of five acres in circuit, or afforded shelter from the torrid sun at one time to one-tenth of an army of ten thousand men. No one who ever spent the long noon-tide of an Indian day under the capacious shadow of a banyan tree, or slept un injured during successive nights under the protection from dews and rains of its shingled foliage, or strolled leisurely for hours along avenues and foot-paths bordered by flowering shrubs and cooled by gurgling streamlets, all within the boundaries of the repeating branches of a single tree, will be disposed to dispute the claims of the banyan to be counted as one of the three monarchs of the woods.

When a banyan first springs from its seed, its method of growth is normal. Like oak, or elm, or beech, or maple, it grows progressively through its different stages of shoot, and plant, and shrub, and sapling, and tree. There is nothing about it that is pecu-

liar. It observes the ordinary routine of vegetable life. Rising in height from year to year, it puts forth limbs which are clothed in foliage. All over the Orient there are banyans, still short of their hundred years of age, which are in no respect peculiar. Like other denizens of the forest, the stranger would pass them by unnoticed. But when its first century is passed, and its burden of successors becomes oppressive, like a hale old fellow of the human race, it seeks support in its children.

Every one is familiar with the fact that different trees shoot out their limbs at different angles to the trunk. The Lombardy poplar, in this respect, varies widely from the elm, and the larch from the willow. The English oak-branch leaves the parent stem at so high an angle as to be almost horizontal. The banyan does the same. But the latter has a length that surpasses the former almost as much as a ship's cable does a coachman's whiplash. Now, it is a well-known law in mechanics, that the longer the arm the more powerful is the lever. The branch of the English oak ceases to grow beyond the point where the lever power would wrench it from the stem. The branch of the banyan does not. One stops at five-and-twenty feet; the other not even at five hundred. Provision must be made, therefore, to give the latter support, and its wonderful peculiarity is, that nature has made such provision.

In the banyan, when a horizontal branch has been put forth to such a length as to render it difficult to maintain itself without breaking, it lowers down from its end one or two more roots, which, entering the ground, send forth rootlets, and themselves become new stems. In due time the horizontal branches, which were once in danger of being destroyed by their own weight, are as easily supported by their pillars as a bridge is by its piers. So the process goes on. Lateral branches shoot out from the main limbs, which latter are constantly growing till they reach gigantic size. These lateral branches also put down stems and shoot out branchlets, until it comes to pass that, in place of a single tree, there is a wondrous colonade of stems, supporting as many natural rafters, on which repose dense canopies of foliage.—

DRINKING WATER.

Dr. Hall is opposed to the immoderate use of water for a drink. He says: "The longer one puts off drinking water in the morning, especially in the Summer, the less he will require during the day. If much is drunk during the forenoon, the thirst often increases, and a very unpleasant dullness is observed, in addition to a metallic taste in the mouth. The less water a man drinks the better for him, beyond a moderate amount. The more water a man drinks the more strength he has to expend in getting rid of it; for all the fluids taken into the system must be carried out, and as there is but little nourishment in water, tea, coffee, beer, and the like, more strength is expended in conveying them out of the system than they impart to it. The more a man drinks, the more he must perspire, either by the lungs or through the skin. The more he perspires the more carbon it takes from the system, but this carbon is necessary for nutrition; hence, the less a man is nourished the less strength he has. The more liquids used the

greater must be the amount of urination; but this detracts a proportional amount of albumen from the system, and it is the albumen in the food that strengthens us. Drinking water diminishes the strength in two ways, and yet many are under the impression that the more water swallowed, the more thoroughly is the system "washed out." Thus, the less we drink at meals, the better for us. If the amount were limited to a single cup of hot tea or hot milk and water at each meal, an immeasurable good would result to all. Many persons have fallen into the practice of drinking several glasses of cold water or several cups of hot tea at meals, out of mere habit. All such would be greatly benefited by breaking it up at once. It may be well to drink a little at each meal, and perhaps it may be found that in all cases it is better to take a single cup of hot tea at each meal than a glass of cold water, however pure.

EBONY.

Of this wood, there are several varieties in the market, the only one serviceable to the carver being one with a close and even grain, so close, indeed, that under the gouge it appears to have no fibre whatever. The hardness renders it extremely difficult to work, and for this reason ebony carvings are of great value. The great defect which this wood has is its tendency to exfoliate and to split. An imitation ebony is sometimes offered, which is made by soaking pear-wood in an iron and tanning dye-beck for a week or more. The color penetrates to the very heart of the wood, so that the cut is as black as ebony.

FEATS OF MEMORY.

Perhaps the most interesting feature with regard to the human memory that has been elicited by psycologists in their endeavors to find out what it is and in what it consists, is the capacity for special training which ordinary memories possess. Under this training average men are able to perform positive feats quite as a matter of course without eliciting our special wonder. Who, for example, has ever considered the case of a conductor of a Third avenue car when the unpleasant vehicle is most unpleasantly loaded down? He knows every person who has paid the fare, and pounces down upon the newcomers who have not with unswerving accuracy. New hands and dishonest men occasionally ask for the fare a second time, but this is of rare occurrence. Gentlemen who go every day to Harlem by this most dismal and uncivilized conveyance will admit that such a demand hardly occurs once in three years. And yet these conductors are not men of even average intellectual power, or of average memory, and their development simply comes from training. The conductor, however, of a New York Central train shows this power, or this possibility of training, in a much stronger light. Like his cogener of the Third avenue horse-line, his intellect and memory are below the average, and yet from the time he becomes a conductor he accomplishes remarkable feats of memory. There are from five to eight, sometimes as many as thirteen carriages filled with passengers in a train. He sees the ticket of each once only, and though there are several hundreds of them, he knows exactly where the new arrivals have seated themselves, where to look for

them, nor does he trouble any of the others to show their tickets. This is a simple thing to write, but in the mind must be a complex arrangement. He must have every carriage, so to speak, abstracted in his mind with all its occupants, and the little details by which he knows them and associates them with their tickets. In No. 1, for example, old man and boy with satchel, Yonkers; fat woman with red face, Yonkers; pretty young lady, Tarrytown; plain young lady with seal-skin jacket, Yonkers; man with red mustache, Utica; two old gentlemen, both Rome; fat lady with smart hat, and pretty ditto, Tarrytown,—and so on throughout the whole carriage. Then all the carriages are similarly treated, and the man's mind becomes a series of maps, in which every seat, with its occupant, is succinctly drawn. Should a man who has shown his ticket lose it, there will be no trouble when the circumstance is explained, for the conductor is sure to remember having seen it. And, what is stranger, the delinquent will appeal confidently to the conductor's memory. Some years ago there was a female who used to travel on the New York Central, and being of an avaricious and saving disposition, she hit upon the device of taking her ticket for a station thirty miles short of her destination, and then declaring, after she had given up her ticket, that it had been for the more distant place. The conductor, strong in his trained memory, insisted upon it that the female's ticket had been for the shorter distance and that she must pay the additional fare; but she resisted, and the voice of the passengers being on the woman's side, she triumphed. But the word was passed among all the conductors, and the next time that the lady traveled on the line, when the conductor (not the same one) came to take the tickets, and she offered hers, he recognized her, and curtly said: "Madam, in order that there may be no mistake this time I'll take your ticket when you are prepared to leave the car." She saw that she was found out, and paid up without demur. All this came from training. And the woman's sheme, though ingenious, was open to this defect, that she had not taken into consideration the muscular memory of a conductor, rendered abnormally powerful by exercise and by a certain power of will which it seems human beings can exert whenever they are compelled by self-interest.

HISTORY OF POTTERY.

Vessels made of baked earth capable of holding liquids doubtless preceded those of metals. It existed among nations of the highest antiquity when still in a very rude state. Bricks were made and used at the Tower of Babel 2200 years before the commencement of the Christian era. The coarse kind of red pottery had been made in England from time immemorial, being in ancient times chiefly manufactured at the place still called the Potteries, in Staffordshire, celebrated for its variety of earthenware. A great improvement was introduced at the potteries in Staffordshire, in 1690, by two brothers, named Ebers, from Nuremberg. They manufactured a new kind of fine earthen-ware, of red clay, which they glazed without lead and by the use of common salt alone; notwithstanding the obvious advantage of this new glazing, in consequence of some jealousy among the neighbors from the process being kept a secret, they obliged the strangers to leave the

country; but not before the art had been learned by a workman, named Astbury, who had made himself acquainted with every part of the process and who afterwards practised it. Common brown stone ware was probably the produce of the same period, having been made in various parts of Europe, ever since the fifteenth century. The manufacture of it was brought from Holland, by some potters who settled at Lambeth. It had the property of bearing the heat of fire, which was not the case with the red-ware. To Astbury, already mentioned, is ascribed a great improvement in pottery, the introduction of flints, calcined and ground to be mixed with clay from which a better white earthenware was made. It is said that accident led to this discovery. While traveling to London, on horseback, in 1720, Astbury had occasion at Dunstable, to seek a remedy for a disorder in his horse's eye, when the ostler at the inn, burning a flint, reduced it by pounding to a fine powder, which he blew into the diseased eye to effect a cure. The potter observing the beautiful white color of the flint after calcination, instantly conceived the use to which it might be applied to his art by mixing it in his clay; and thus made the first white stone-ware. This paved the way for greater improvements by Josiah Wedgewood, who was a young son of a Staffordshire potter, and born in 1730. This extraordinary man overcame all the difficulties of his early life by industry and perseverance, and applying himself to a great variety of improvements in pottery, not only succeeded in acquiring a fortune, but became a benefactor to his country by carrying the art of pottery to a high degree of perfection, and creating a commerce which to this day proves a source of national wealth.

But the merit of Wedgewood did not consist merely of having the sagacity to perceive that a profitable business could be formed by improvement in his art. His mind was of a higher class. He gathered around him the talent of various countries, and by the liberality of his conduct towards the persons whom he engaged, encouraged them to give him the most effective assistance in completing those views which his genius imagined, but which he never could have accomplished alone. He engaged Mr. Chisholme, an able chemist, with instructions to select the best materials for perfecting his various processes. He also liberally provided for him in his old age. Not satisfied with improving the materials of pottery, he was desirous of giving greater value to it by improvements in form. The ablest modelers were brought from Italy, and other countries, who were acquainted with the works of the ancients. The consequence was that English pottery became celebrated throughout the world. He encouraged the efforts of genius in others, and in lessening, as far as lay in his power, the sufferings of his fellow creatures. The disposition and manners of Wedgewood were such that he became the object of admiration and esteem for his moral, as for his intellectual qualities. He died in the sixty-fifth year of his age. In 1763, Wedgewood manufactured a kind of ware for the table, of a cream color, which came into use under the name of *queens-ware,* which was conferred upon it in consequence of the patronage of her majesty.

The ware known in general as Wedgewood's is a kind of semi-vitri-

fied pottery. Wedgewood's Egyptian ware was used extensively for the tea-table, which rivaled in design the works of Greek and Roman artists. He made what he called the *jasper-ware,* which had elegant bas-reliefs on a blue ground. Through the infidelity of a servant the secret was disclosed and sold, so that others executed the same art. Among the ornamental works may be mentioned two imitations of cameos; one of a slave in chains, of which he distributed many hundreds to induce the suppression of the slave trade; and the other representing Hope attended by Peace, Art and Labor, made of clay from Australia, to show what is produced there. Wedgewood's ware consisted in its excellent workmanship, its solidity, standing the action of the fire, its fine glaze, etc.. etc., which has created such a large demand for his class of goods all over the world.

ANCIENT TABLES OF WOOD.

A very general opinion prevails that the rich folk of ancient days were rather a poor set of fellows in comparison with our modern nabobs; and that they could not afford to buy decent chairs and tables for their parlors. We are also liable to lift up our hands in astonishment at the domestic extravagance sometimes displayed at the present day, and to consider that this is the age superlative of foolish expenditures for fancy bits of household garnishings. We rather think that with all the public self-complacency for modern grandeur, the old Romans would "take the shine" out of us, in the table line at any rate. Pliny estimates that Cicero once paid about $45,000 for a fancy table of citrus wood, and that one which had belonged to King Juba, on being exposed at auction, was knocked down for the nice little sum of $54,000. As Cicero was a Roman lawyer, we would like to know which of his disciples in New York could afford to present such a comfortable table to his amiable spouse at this day.

Among the Greeks and Romans there existed, for a period of one hundred and fifty years, a ruling passion to possess beautiful tables of citrus wood, the finer specimens of which were compared to gold for their value. The veins of this wood run in spirals and wavy lines, and these were rich and brilliant in their colors, being a mixture of wine-and-honey colored veins. Its polish, without any varnish, was brilliant as glass. It had a fragrant odor, and for this reason it was sometimes employed in religious sacrifices and for statues of the heathen gods.

A knowledge of the tree from which this famous wood was obtained has been lost for centuries; but a correspondent of the London *Builder* states that it is the *callitris quadrivalvis,* or wild-spreading cypress of Mt. Atlas, and that the most fancy pieces employed in the ancient tables were obtained from excrescences or knots, something like the elm knots of which wooden bowls are frequently made in various parts of our country. The Roman citrus tables were generally of a round shape, supported on ivory legs, carved out to represent those of animals.

The principal ornamental woods now used in the manufacture of fine furniture are mahogany, rosewood and black walnut—rosewood being the most highly esteemed, not because it is finer in the grain than mahogany but because it has the greatest contrast

of colors, and is not so monotonous to the eye. In California there are some beautiful colored woods which have not yet been introduced into our cabinet work; but they no doubt will yet find a place in the parlors of our people, if it were upon no other consideration than to afford pleasure from their variety. A few years ago curly and bird's-eye maple were employed extensively for making chairs and other articles of furniture, but the demand for these woods has almost ceased. Splendid logs of these kinds of maple, which a few years since would have brought a high price, are now burned for fuel in various portions of our country, there being no demand for them for any other purpose. The peculiar appearance of these woods is now imitated by staining soft timber which is so much easier worked that cabinet-makers prefer to operate with the imitated rather than the genuine article. Oak has recently come into pretty good repute in chair-making, and it is certainly a very beautiful wood for this purpose, but not equal to American bird's-eye maple.

The fashion for tables, at present, is very different from that which reigned in Rome in the days of Cicero; fine marble, not wood, being the prevailing material employed for the tops. Our taste may not be so refined as that of some others in this respect, but we certainly think marble is inferior to fine wood in any point of beauty for this purpose; it is totally devoid of that warmth of color which is so pleasing to the eye in rosewood and the finer qualities of mahogany.

To Preserve Eggs.—Put a drop of grease of any kind on them, and they will keep for a long time.

SPANISH CEDAR.

This wood, though it is seldom used for veneers, or by furniture makers in any form, is generally sold by dealers who handle fancy woods. Spanish cedar is brought, small quantities at a time, direct to Boston as well as New York. It is produced largely in Cuba and Mexico as well as in Brazil and Guiana. In the country, back of Surinam, it is collected by Indian tribes, who stipulate to bring in a certain quantity for so much rum delivered in advance, and are said to always keep their word. All the cigar boxes made in this vicinity, and nearly all on the Atlantic seaboard, are manufactured from Spanish cedar, and this is the principal use to which the wood is put. Two-thirds of those produced in the West are made from poplar and sycamore.

Spanish cedar, unlike the more costly fancy woods, is sawed during the process of manufacture. Veneering is now almost entirely cut by knives, special machinery having been invented for the purpose. The new method makes a great saving for manufacturers of veneers.

OPIUM MANUFACTURE.

Nearly all of our readers have seen the Common or White Poppy, but those of us who know it only as a garden plant, can scarcely realize how beautiful it appears in the lands where it is cultivated for its commercial value.

There it grows to a height of from four to six feet, and when in bloom, its white flowers floating on the waves of polished dark green leaves, give to the broad fields the appearance of great ponds covered with lilies.

The poppy is extensively cultivated in Turkey and Persia, and also, though to a less extent, in China; some of the experiments which have recently been made with it in Europe have met with good success. But the great opium producing districts are in India; there the cultivation of the plant and the manufacture of the drug make one of the chief industries of the country. One of these districts, including the great factories of Patna and Ghazeepore, is 600 miles long and 200 miles wide, and is entirely given up to the business of opium producing. The seed, which requires a naturally rich or manured soil, is sown in the beginning of November; in a short time it appears above the ground and continues growing with great rapidity until February, when it flowers; the cultivation up to this time consisting in simply weeding and thinning, with occasional irrigation if the ground is in danger of becoming too dry.

Three or four weeks later the poppy head, averages the size of a hen's egg, matures and is ready for the wounding. This is done early in the morning, or before sunrise, with a small knife made of several thin pieces of iron fastened together and notched at the end like a saw; with this instrument the operator makes a jagged cut in the poppy head, from which wound a milky fluid exudes during the day, thickening at night into a brownish colored gum; the next morning this is carefully scraped off and collected in small earthen jars, and from these it is transferred to shallow dishes resting on slightly inclined boards, so that all the watery fluid may run off; by this means it gradually hardens into thin cakes, which are carefully watched and turned that they may dry equally. This process usually takes a month's time, after which the cakes are packed in jars similar to those in which the gum is collected, and sent to the factory. The weather during collecting time is watched with anxiety, as the success of the crop depends in a great measure upon its character; dry weather diminishing the flow of the gum and rainy weather injuring its quality; mild, moist nights, with night dews give the best results. When the jars arrive at the factory, their contents are carefully weighed and tested, and the value accredited to the collectors. The opium is then cast into huge vats and thoroughly kneaded; it is afterwards distributed in small quantities to men and boys who mould it in small cup-shaped vessels into little balls, which are covered with thin leaves of poppy and laid away in the drying room; when perfectly hard and dry, the opium is ready to be sent to the market.

OPIUM-EATING.

"Opium is the inspissated juice of the poppy—*papavers omniferum*—which is grown chiefly in Asia Minor, and is obtained by making incisions in the head of the plant. The juice flowing from such incisions is collected in tears, which are formed into masses, varying in weight from eight ounces to one pound. After the gum is thus obtained, it is enveloped in the petals of the flower, and shipped as other commercial products, yielding an immense revenue to that country." As before stated, morphine, laudanum, and all other preparations from this drug are compounded by chemists and apothecaries. The first being an alkaloid, obtained by the action of chemical agents, as before alluded to, on the crude opium, and is a condensation of

its narcotic principles, a reduction of bulk, uniting its narcotic powers, for the convenience of administration in cases where it is indicated. Laudanum —*Tinctura Opii*— this is the result of the action of alcohol on the drug, and possesses in an approximate degree all the properties of the original. This liquid preparation is more generally used than any other; and as it is generally below the standard or regular formula for strength, is considered the least dangerous. Having before stated that in neither opium nor in any of its preparations, are there any curative principles, and that it is used solely for relieving pain, or holding in abeyance the excessive action of some organ until a remedy can be applied, it will be readily seen that it is not a proper remedial agent of the pharmacopœia, and hence in one sense of the word it is not entitled to be ranked as a remedial agent in medicines. But let medical men consider it a remedy if they choose, and use it as such, but let them at the same time fully inform each patient to whom it is administered of the character of the drug, and the terrible risks in using it, even in a moderate way for the alleviation of pain, if continued for any length of time. For it is only in the moderate use of this poison at first that its abuses are reached. Like every other habit, that of opium-eating is acquired; and in most cases it is induced by the existence of some disease, or pain resulting from wounds or other injuries, or surgical operations. The patient realizes the fact that the drug has the effect of alleviating his or her sufferings, and it is continued as often as the twinges of pain return. It not only relieves the pain, but in the partial suspension of the functions of the organs, sleep is induced. When the patient awakes, that dull, monotonous feeling, incident to the relaxation of the system in recovering from the effects of the narcotic poison, is mistaken for the original pain, and the patient goes to his or her *pseudo* remedy again. This is continued day by day, until at last, step by step, the victim reaches a point where the horrible truth is at last revealed, that he is the abject slave to not only a habit but an actual necessity. It is found that opium has become the vital power of nature, and the patient is transformed from a natural, reasoning being into an unnatural, unreasonable automaton, that can only perform its functions when supplied with the poisonous stimulant. It might be asked in this connection, what are its effects on the system? The poison penetrates every portion of the system, the muscles, the nerves, fibres, cells, capillaries, and in fact everything that enters into the organic arrangement of the human being,— and when its use is continued every interstitial is filled with it, until at last the miserable victim becomes an opium monument, as thoroughly subject to its power as the carved statue is to the chisel of the sculptor.

But no one can know the effect of this drug so well as those who have been victims to its use for years. An eminent physician of Maryland says, "I have noticed in treating this disease, that it first stimulates slightly the nervous system, circulation and respiration, which are under its immediate control; it then acts as a sedative to a large extent; it also acts on the cerebrum, or seat of the mind, in such a manner as to produce sleep. Annexed to these main points as known by the habitual user of the drug, are paralysis of the nerve cen-

tres, which cause in part the rapid increase of the drug necessary to sustain the system, and places the user beyond the power to retrace his steps back to the beginning, even by the shortest manner of diminishing the dose, as has been tried by the most determined and powerful minds of the present age, as well as those of other ages. It causes fulness of the head which is actual congestion of the brain; it diminishes the secretions of the intestinal organs, as well as the bile and urine, which causes constipation. In brief it is an insidious, delusive drug, that invites the partaker to the exhilarating pleasure of the moment, but gives no warning of its unhappy and final result.

YANKEE LOCOMOTIVES IN EGYPT.

On the railway between Alexandria (Egypt) and Suez, recently finished, there are four locomotives — two of them are of English manufacture and the other two were built at Mason's Works, Taunton, Mass. It seems that the Pasha's ears are open to flattery, and the English engineers, through their Consul, use every possible means to get rid of the American engineers. They were told by the railway company that the engines were not going to be used, and that their services would not be needed. The excuse for giving them up was that they are not strong enough to haul the heavy trains. One of the Americans, getting an opportunity to speak with the Pasha, told him he could haul as many loaded cars as would reach from one end of the road to the other. Accordingly, seventy-five heavy loaded cars (which were all they could muster) were put in a train, the Pasha's own car attached, and the whole taken through to Suez, a distance of 200 miles, in twelve hours, making stoppages for fuel and water. The Pasha exclaimed, in Egyptian, — "God is great, but a Yankee is very near perfection!" On his return, he discharged the English engine drivers and now uses the Taunton engines altogether.

PERPETUAL WEATHER TABLE.

The following weather table, constructed by Prof. Herschel, will be found wonderfully correct:

If the moon changes at 12 o'clock, noon, the weather immediately afterward will be very rainy, if in summer, and there will be no snow or rain, in winter.

If between 3 and 4 o'clock P. M., changeable in summer — fair and mild in winter.

Between 4 and 6 o'clock, fair both in winter and summer.

Between 6 and 10 o'clock P. M., in summer, fair, if the wind is northwest; rainy, if south or southwest. In winter, fair and frosty, if the wind is from the south or southwest.

Between 10 and 12 o'clock P. M., rainy in summer and fair and frosty in winter.

Between 12 at night and 2 o'clock A. M., fair in summer and frosty in winter — unless the wind is from the south or southeast.

Between 2 and 4 o'clock A. M., cold and very showery in summer, and snow and storm in winter.

Between 4 and 6 o'clock A. M., rainy both in summer and winter.

Between 6 and 8 o'clock A. M., showery in summer and cold in winter.

Between 10 and 12 o'clock A. M., showery in summer and cold and windy in winter.

TROPICAL WOODS.

From Surinam, and other South American ports, and from the West Indies, there is brought what is called in this country leopard wood and in England letter or snake wood. It is imported direct to Boston. It is a beautiful variegated wood, and as each piece is very small in diameter, its principal use has been found in making fancy canes. This business of manufacturing canes and umbrella and parasol handles from foreign fancy woods has been carried to much greater lengths in England than with us. Immense quantities of small and curious woods are imported to that country for that purpose.

Formerly a good deal of zebra wood was brought to this country from Rio Janeiro, and used for veneers for mirror frames, backs of brushes, etc., but it is now almost out of fashion. A wood with a similar striped figure is also found in Australia, and the same name is given to other woods. Partridge wood, streaked with red, brown and black tints, like the wings of that bird, is brought from Brazil. Another name it bears is pheasant wood. It is used occasionally for canes and umbrella handles.

Lignum vitæ is imported in large quantities from Hayti and other West India Islands. Its principal uses are in the manufacture of shoe-makers' tools, wheels for pulleys, and "dead eyes" on ships' rigging. Boxwood is another hard imported wood, which is used largely in the manufacture of carpenters' rules and musical instruments, and is also in great demand for wood engravers. There are two varieties, known respectively as Turkish and European. The former is brought from Smyrna, Constantinople, and various other ports along the Black Sea, and the latter from Lisbon and other ports on the Spanish peninsula and from Leghorn.

The English import what they call lance wood from Cuba and Jamaica, and as it is very pliable employ it in the manufacture of such elastic articles as gig shafts, archery bows and springs. It is also used in making surveyors' rods and billiard cues. It is occasionally seen in this country, where it is worked up into fishing rods and fancy carriage work.

From the Brazils are imported tulip-wood, of a dark purple color, used in making ram-rods, as well as for veneers, and king-wood, which is employed in small cabinet work. The latter is beautifully streaked in violet tints of different intensities. It is finer in grain than rosewood, which it otherwise resembles. Turtle-wood is another article that bears a similarity to rosewood. Its name sufficiently indicates the nature of its figure. It is used for turnings. Tulip-wood is very costly, being worth, when cut, from ten to fifteen cents a foot. This wood is found not only in Brazil, but also in both the Indies and in Africa.

A South American wood that is imported a little to this country, and still more to England, is the cocoa, cocus, or cocobola, as it is variously termed. It is used in the manufacture of cutlery ware, especially for case-knife handles.

Hidden among the dense South American forests there doubtless grow scores of most beautiful woods, still unknown to us, which, if introduced, would at once become very popular. Scarcely a year passes but new woods are thus brought to the notice of veneer manufacturers.

The island of Santo Domingo is

almost the only producer of the beautiful satin-wood, which is becoming popular among our manufacturers and makers of various kinds of veneers. Inlaid with other woods it is especially in demand for picture frames. The tree that produces satin-wood is said to resemble our American maple.

EAST INDIA WOODS.

Many very beautiful perfumed and fancy woods are native to Further India and China, where they have been long manufactured into various household articles, and have always been highly valued. Few of these have found their way to our markets, either in the raw or manufactured state. The teak, a species of oak, both black and yellow, is extensively used in those regions in the manufacture of every kind of wood work requiring a firm, bright, lasting material. It is also largely employed for ship-building purposes, as it resists to a remarkable extent both the action of time and the ravages of insects. It has of late years been used for this purpose in English dockyards.

Another fragrant wood brought from the East, mainly China, is sandal-wood. It is used largely in making fancy brackets, a business that has begun to assume some prominence among us. Many other small fancy articles are also made from it. In Eastern countries this sandal-wood is burnt in large quantities at sacrifices. American dealers occasionally sell a lot for smoking purposes. It is very costly, the three varieties — white, yellow and red — being about equally valuable. The chips and sawdust are utilized, sandal-wood oil being distilled from them. Such gains have been realized from the sale of this wood, that the tree has become extinct in many localities where it formerly grew abundantly. The tree is small, and attains maturity in about twenty years.

At the foot of the Himalayas are grown the toqua and deodora. The former when suitably polished makes very beautiful cabinet furniture. The distinguishing qualities of the latter are its fragrance and its almost imperishable nature. Many Hindoo temples are supported by pillars of this wood that were placed in position eight hundred years ago. It is by no means difficult to work. The wood is yellow. Many are of the opinion that this deodora tree is identical with the Biblical cedar of Lebanon.

Other Eastern fancy woods, some of which have been introduced into Europe in manufactured forms, are the hoonsay, which has alternate red and black streaks; the biti, which is open grained and slightly resembles rosewood; the nelleck, of a dark flesh color; and the novaladdi, a greenish brown, close-grained wood which takes a good polish. Liverpool, which is, as we have said, the world's market for fancy woods, imports many other varieties of these beautiful East Indian and Australian woods.

OLIVE TREES.

In the single county of Nice there are 800,000 olive trees, and from this one district alone $360,000 worth of olive oil, olives and perfumery was sent to the United States in 1874. There are 300 varieties of French olives. Five special sorts are grown about Nice. The glossy black berries, ground in the mills, furnish the well-known oil. Then the kernel, which in this process has been crushed, is dried

and used universally for fuel, while the dead leaves serve the purpose of all dead leaves. The wood of the olive is highly prized by cabinet-makers for their finest articles, especially in marqueterie, admirably executed at Nice and Sorrento. Thus the whole tree is valuable from root to branch. There are thirty varieties of fig trees about Nice.

SULPHUR.

This article of commerce is at present almost entirely received from Sicily. Although there are abundant deposits of the mineral elsewhere, the rate of labor at that point, only eight to ten cents per day, creates an effective monopoly of the entire traffic —the mode of condensing, too, is the very crudest and cheapest, being as simple as, and very similar too, a common charcoal pit. Efforts have been repeatedly made to relieve the United States from the burden imposed on her by the sulphur monopoly, especially as she has abundant material within her own borders and in the adjacent West Indies; but thus far, nothing effective seems to have been done. In Texas there are large deposits of the mineral, and various parties have endeavored to utilize them; but the expensive transportation to the coast, and the depth below the surfaces where the material occurs, combined with the high price of labor, has rendered all operations futile. In the West Indies, on the islands of St. Vincent, Granada, Nevis, Saba and others, there are immense bodies of sulphur; but then, again, one dollar per day cannot compete with ten cents in getting out the raw material. Prof. Cleve, of Stockholm, who has visited Sicily and other sulphur localities, says the supply extends across the island; and at various depths, where it crops out of the cliff full one hundred and seventy-five to two hundred feet above the sea-shore, it is entirely pure. Prof. Pontiex, of Demarara, who also examined the island, concurs in the above, which is in fact verified by subsequent explorations and developments. Sulphur outcrops in crystals all over the face of the country, and is always found two or three feet below the soil.

SPRUCE FIR.

The spruce or Norway fir has many varieties. The white fir of Norway is the common spruce fir of our woods. In Norway there is a distinction made betwixt the white and red spruce. The former grows on light, poor soil, and elevated situations, and has lighter foliage and white wood; the latter grows in more substantial soils, in the valleys, and has a darker, stronger foliage and red wood, which is more resinous, and of much greater strength and durability. Both of these varieties are to be found in our plantations, under the name of common spruce fir. The common spruce is indigenous to many mountain ranges, both in Europe and Asia, where the surface of the soil is moist, and the atmosphere cold and humid. It is found generally over Europe, but most commonly in the north of Germany, Denmark, Norway, and Sweden, and in Lapland, as far as north latitude 69 degrees. In Asia it is found in Siberia, growing on cold marshy soils, betwixt the mountains, reaching the Arctic Circle, and in some instances beyond it.

The value of the wood of the spruce fir is to the beech as 1.079 is to 1.540; both as fuel and as charcoal the spruce

is superior to the silver fir. The ashes furnish potash, and the trunk produces immense quantities of resin, from which Burgundy pitch is made. The bark may be used for tanning, and spruce beer is made from the buds and young shoots. The chief purposes for which the timber of the tree is used are scaffold poles, ladders, spars, oars and the masts of small vessels; and as planks and deals, it is used for flooring, for musical instruments, for carving, and by cabinet makers for lining furniture. The wood, being fine-grained takes a high polish, and does well for gilding on, and it will take a black stain as well as the wood of the pear tree. In carving this wood is easy to work, taking the tool very readily; and no wood glues better.

The young trees, especially if the bark is kept on, are found to be more durable than any other species of pine or fir, with the single exception of the larch, and for this reason they are admirably adapted for fencing, or for forming the roofs of agricultural buildings, as well as many other purposes connected with rural economy. Ponty, in his "Profitable Planter," says that he often found branches of this tree that had lain in the woods dead for some twenty years perfectly sound. Some trees cut down at Blair, the property of the Duke of Athol, many years ago, were used for spars and topmasts, and were found equal in quality to those imported from Norway.

Pliny frequently mentions the spruce fir, which, he says produced tears of resin that could scarcely be distinguished from incense. He also mentions its use in funeral ceremonies, on which occasions a branch was placed at the door of the house of the deceased.

ROSEWOOD.

It has puzzled many people to decide why the dark wood so highly valued for furniture should be called rosewood. Its color certainly does not look like a rose, so we must look for some other reason. Upon asking, we are told that when the tree is first cut the fresh wood possesses a very strong, rose-like fragrance; hence the name. There are half a dozen or more kinds of rosewood trees. The varieties are found in South America and the East Indies and neighboring islands. Sometimes the trees grow so large that planks four feet broad and ten in length can be cut from one of them. These broad planks are principally used to make the tops of pianofortes. When growing in the forest the rosewood tree is remarkable for its beauty, but such is its value in manufacture as an ornamental wood, that some of the forests where it once grew abundantly now have scarcely a single specimen. In Madras, the Government has prudently had great plantations of this tree set out, in order to keep up the supply.

THE TRICKS OF THE ALCHEMISTS.

During the sixteenth and seventeenth centuries the practice of alchemy was held in the highest repute by men of learning, while princes and even kings were seized with the popular delusion. At the same time spurious alchemists infested the country, passing from town to town, and by the most specious deceptions imposing upon the inhabitants. These practitioners with the greatest ease procured from their dupes necessary funds, which they — as the pioneers in the cause of science and on the point

of making the grandest discovery that had ever enriched the world—required to complete their costly experiments. The more readily to attain their ends, the pretended alchemist would exhibit to the gaping multitude, sometimes an apparently rusty nail, which he, with great gravity and muttering some cabalistic words, would plunge into the wonderful liquid of transmutation: after the lapse of a few moments, the nail is shown with its lower portion turned into the precious metal. With such proof before their eyes, the credulous audience could not withhold the small pittance, their insignificant offering on the shrine of science, which the learned operator needed to renew his wonderful liquor, and the cunning pretender repaints his gilded nail, fills again his vial with pure water, and passes to the next village. Sometimes a lump of lead was exhibited, into which a piece of gold had previously been introduced. On heating, the lead was gradually oxydized, leaving the precious metal behind, or a crucible, concealing beneath a false bottom a bead of silver, is exposed to the action of heat; some simple powder being now thrown in, the vessel is cooled, broken, and the silver is discovered. Even such a shallow deception as washing a coin with quicksilver, thus giving it a silvery appearance, proved sufficient to deceive the simple populace.

But while these impostors were thus successful, the study of alchemy was faithfully pursued by such scholars as Augurello, Cornelius Agrippa, and the unfortunate Bombastes Paracelsus. Hitherto the sole aim of these enthusiasts had been the transmutation of the base into the precious metals; but about this time a new object to be attained presented itself. The success which had attended the use of mercury, antimony, and several chemical preparations in the treatment of certain diseases, awakened the hope that by diligent study the discovery would be made of some universal medicine which should heal all disorders, and prolong human life indefinitely. This new field was occupied by new zealots, and one of these was Paracelsus, who, maintaining that strong distilled alcohol was the desired elixir vitæ, fell a sacrifice to his enthusiasm by drinking too freely of this preventive of old age.

The decline of alchemy may be dated from the middle of the sixteenth century. Few writers of reputation after that time wrote professedly on this subject, though a kind of half belief in its truth was long after cherished by even the most eminent chemists, and occasionally individuals appeared boldly claiming success in the science: such men were Agricola, Denis Zachaire, Dr. Dee and his co-laborer, Edward Kelley, and, as the last of the alchemists, Helvetius, Jean Delisle, the Count de St. Germain and Cagliostro. Even so late as the year 1784, Dr. Price, F. R. S. publicly proclaimed his ability of creating gold at will, but an investigation into his process being determined upon by the Royal Society, finding detection inevitable, the would-be alchemist finished his course by committing suicide.

The poverty of the alchemists as a class became proverbial, thus though avowedly in possession of the art of making gold, they were at any time willing to divulge this secret merely for a small amount of what they pretended to produce in any quantity. Although it cannot be claimed that the researches of these philosophers were in the domains of true science, yet in their fruitless efforts for obtain-

ing the philosopher's stone, or the elixir of life, the world acquired information of far more value than the possession of either would have conferred upon it, in the advancement made in the rudiments of what has since their day developed into the science of chemistry.

CHAMOIS.

The chamois of commerce is a variety of soft pliable leather obtained by tanning the skin of the animal of the same name belonging to the antelope species. The leather is used extensively for burnishing metals, jewelry, glass, precious stones, silverware, fine woods, etc., and also in some cases for linings, and as a filling in or pack for surgical instruments. A great deal of the leather sold in the shops is nothing but finely tanned sheepskin; but this is not nearly so soft or strong as the genuine article, although it is held at the extreme prices asked for the imported and real chamois leather. The animal known as the chamois chiefly inhabits the Alps and Pyrenees mountains in Europe, being found in flocks of from half a dozen up to a hundred in number. It is of an exceedingly wild nature, and has never been domesticated. Its size is about that of the domestic goat, of a dusky yellow brown color, with the cheeks, throat and belly of a yellowish white. It is very agile in its movements, and when being pursued bounds over the ground with great rapidity. The horns are black, slender, upright, hooked backward at their tips, and about eight inches in height, and are very graceful, both in proportion and appearance. At the base of each there is a good sized orifice in the skin, of which the use is unknown. Like all animals of the antelope species, the chamois has sparkling and beautiful eyes. It feeds only on the sweetest and finest herbage of the mountains, and its flesh is of a very delicate flavor, and is highly prized.

When alarmed, the chamois hisses with such force as to be heard at a great distance, more particularly so as the abrupt walls of rock re-echo the note which is heard from every angle of the surrounding declivities. Pausing a moment the animal looks about him to see if he is pursued; and finding its apprehensions well founded, he repeats the hisses, and strikes the ground with his forefeet with great violence. In this way an entire flock is frequently alarmed, and seek to provide for their safety by a precipitate flight, bounding from rock to rock, and evincing the utmost agitation until they are far from the reach of danger. The hissing of the male is much louder than that of the female; it is performed through the nose, and is, strictly speaking, the force of a strong breath, driven violently through a small aperture. Chamois hunting is a very perilous occupation, pursued as it is among the defiles and chasms of the mountains; but yet, there are many persons who pursue it, both for the profit and excitement it affords them. The hunter must be sure footed, brave, and fertile in resources, as he frequently encounters great dangers that may end in the loss of his life.

Heat is very disagreeable to the chamois, and they are very seldom seen in summer, except in excavations in the rocks, surrounded by fragments of unmelted ice, or under the shade of overhanging precipices which face the North and effectually keep off the rays

of the sun. They drink but sparingly, and chew the cud in the intervals of feeding. When in rapid flight from any cause they make the most wonderful leaps, and frequently throw themselves across a chasm and down a perpendicular wall of rock twenty or more feet in height. Thousands of these animals are killed annually both for the sake of their flesh and their skins; but such is the demand for the leather in civilized countries that immense quantities of inferior goods are sold to consumers.

THE OLD RED CENT.

As the old "red cent" has now passed out of use, and, except rarely, out of sight, like "the old oaken bucket," its history is a matter of sufficient interest for preservation. The cent was first proposed by Robert Morris, the great financier of the Revolution, and was named by Jefferson two years after. It began to make its appearance from the mint in 1792. It bore the head of Washington on one side, and thirteen links on the other. The French Revolution soon created a rage for French ideas in America, which put on the cent, instead of the head of Washington, the head of the Goddess of Liberty — a French Liberty, with a neck thrust forward and flowing locks. The chain on the reverse side was displaced by the olive wreath of peace, but the French Liberty was short-lived, and so was her portrait on our cent. The next head or figure that succeeded this — the staid, classic dame with a fillet around her hair — came into fashion thirty or forty years ago, and her finely chiseled Grecian features have been but slightly altered by the lapse of time.

MANUFACTURE OF LOCKS.

There is much that is curious and interesting in the history of lock-making which dates back to a far more remote period of history than is generally supposed. The labors of the antiquary disclose the fact that some of our most modern improvements in the construction of locks are merely the accidental reproduction of inventions that originated many centuries ago. The ancient Egyptians, those silent custodians of more than one of the "lost arts," undoubtedly manufactured locks with tumblers which held the bolt until they were moved by the key, a device usually considered to be of modern origin. Amid the ruins of Thebes, and in other localities, iron keys have been found, evidently designed for locks of this description.

That the Romans also made locks of intricate construction is evident from the numerous discoveries in Herculaneum and Pompeii, and in England there have been found keys which were doubtless contemporary with the Roman occupation of Great Britain. Ages ago the Chinese made wooden locks which operated upon precisely the same principle as the famous Bramah lock which was invented in England in 1784, and was regarded as the first great improvement in lock-making.

In the Bramah lock, so named from its inventor, the use of wards was dispensed with, and other peculiarities of construction gave it the reputation of being a lock that could not possibly be picked. For many years a lock of this kind was displayed in the window of the office in London, with a reward of two hundred pounds to any one who could pick it. This feat was

accomplished in 1851, by Mr. Hobbs, whose first attempt occupied nineteen hours, owing to the breaking of one of his instruments, but he subsequently repeated the operation three times within an hour.

The next lock of any prominence was Chubbs', invented in England in 1818. This was also easily picked by Mr. Hobbs. At the London exposition of 1851, Mr. Hobbs presented for the attention of mechanical experts a lock made by Mr. Pyes, which defied the ingenuity of the best English locksmiths, but was finally picked by the late Mr. Linus Yale, Jr., who was for many years the president of the Yale Lock Manufacturing Co., of Stamford, Conn. This triumph of American skill was frankly recognized by Mr. E. B. Denison, the celebrated lock maker of London, who says that American locks "are vastly superior to any we have ever seen made in England; and, on the whole, the United States are evidently ahead of us in the manufacture of both good and cheap locks."

Within a few years past the hardware business, in all its innumerable departments has become an interest of immense, importance in this country, and among the countless articles embraced under the generic term hardware, locks may be regarded as one of the most prominent. There are of course numerous claimants for distinction in this branch of production, but for ingenuity of design, excellence of material, finished workmanship, and above all, absolute security, none sustain a higher reputation than the celebrated Yale locks above alluded to.

As first manufactured nearly thirty years ago by their inventor, the late Mr. Linus Yale, senior, these locks were a decided improvement over their predecessors, but their range of application was limited, and their costliness prevented very general adoption. Some years subsequently, Mr. Linus Yale, Jr., invented a lock of different and superior construction, having a flat, folding key, but his attention being soon directed toward bank locks, regarding which great interest was then felt, he for several years confined his labors to their improvement, patenting numerous inventions of great value.

In 1860, Mr. Yale resumed the production of key locks for general use, and soon afterwards patented a style of lock which, with subsequent improvements, has since rendered his name so celebrated. It was one of the description called a "pin lock," identical in some respects with that previously made by his father, but possessing the distinctive feature of a key of thin, flat steel, less than an inch and a half long, and weighing but a fraction of an ounce.

The width of the key admits of ten different "bittings," or depths of notches, therefore a lock with but one pin could be variously "set up," so as to be opened by ten different keys. In a lock with two pins, the number of changes, or varieties of keys, will be 100; three pins, 1,000; four pins, 10,000; five pins, 100,000; six pins, 1,000,000; seven pins, 10,000,000. The least number of pins contained in any of the Yale locks is four, as in drawer and desk locks; the night latches have five; the post-office, heavy store door locks, etc., six; and the "safe deposit" locks,—for inside doors of safes, vaults, etc.,—have seven pins.

PAPER of cotton rags invented towards the close of the tenth century. Paper made of linen in 1300.

JAMES WATT.

Men differ from one another in greatness as the stars do in glory. Some are brilliant as solar orbs, and emit a splendor of their own; others like planets, which exhibit a beautiful but borrowed light; while others, again, twinkle only as feeble asteroids, almost defying the powers of the telescope to recognize. Among the great shining lights that have reflected a power of their own upon this earth, James Watt, the great inventor of the steam engine, occupies the elevated position in practical mechanics which Sir Isaac Newton does in natural philosophy. In the accomplishment of great results, affecting all classes of society in multiplying the productive powers of industry and art, he stands high above all other men, as Saul stood above the tribes of Israel. This great inventor and mechanician was born in January, 1736, in Greenock, a seaport town in the west of Scotland, and, being of a delicate constitution, he received most of his youthful tuition from his father and mother at their fireside. An early display of talent for mathematics and mechanics was cultivated with assiduity, and, when quite young, he constructed various ingenious machines and instruments. During a single year's instruction in the city of London, as a philosophical instrument-maker, he became as skillful a workman as several journeymen in the same shop who had been engaged at the business for ten years. After this, he came to the city of Glasgow, was furnished with a shop within the college walls, and received the title of mathematical instrument-maker to the University. Here his talents were early appreciated by the professors and students, especially by Dr. Black, the father of modern chemistry. It was while repairing a model of Newcommen's atmospheric engine (which was used in lecturing by one of the professors), that he invented the "separate condenser" to the engine, and thus changed its whole character, and quadrupled its powers. Of all the inventions which the ingenuity of man has devised, it is the most wonderful and useful. It greatly resembles the human body in its mode of operation. The cylinder, like a great heart, receives the steam by throbbing valves, and it becomes animate with power and motion,—forging a needle, spinning a silken cord, weaving a carpet, knitting a stocking, propelling the majestic steamer across the ocean, and the rolling car over the iron-bound course through forest, field and prairie. So practical and synthetical was the genius of Watt, that he constructed the steam engine, and left it very nearly as perfect as we now have it, except in its adaptability and application to railroads. It is not possible for us to estimate the value of the benefits which his inventions have conferred upon mankind; we can do but little more in our brief space than acknowledge their importance.

The old atmospheric engine, as Watt found it, was single-acting. Steam was admitted under the piston into the cylinder, then cut off, and a jet of water then condensed it, when the piston descended; then the water was let out, steam again admitted, and so on continuously, wasting an immense amount of time and heat.

The manner in which his invention originated was peculiar. The model of the atmospheric engine which he was employed to repair having greatly excited his mind, he examined it thoroughly, and soon comprehended its

entire principle of action. He became satisfied that it was radically defective in some points; that it wasted an immense quantity of heat, and could not be made to operate rapidly by any arrangement whatever, owing to the successive heating and cooling operations in the cylinder at every stroke. Occupied with such thoughts, he took a walk out into the green fields, and during his meditations, the idea of condensing the steam in a separate vacuum vessel flashed across his imagination like a gleam of lightning. Almost as soon as the thought entered his mind, he mentally arranged mechanical devices to test it, and by next day at noon he had a rude model constructed, and proved the value and correctness of his grand conception. After securing a patent, he found it very difficult to get a person of sufficient wealth and enterprise to engage in building large engines. This, however, he at last fortunately secured in Mr. Bolton, a wealthy Birmingham manufacturer. The first engines they built were for pumping the deep mines of Cornwall, and they were sold under the most favorable and honorable conditions; the tax asked for their use being one-third of the price of the fuel they saved annually. After their value and usefulness had been established, there were several parties who were mean enough (even when making fortunes by their use) to try to cheat him out of his rights, just as there are parties who try to cheat inventors at the present day. On this account he was involved in several lawsuits, and on one occasion had to pay $30,000 for London lawyers' fees alone. This he considered a great extortion, but he bore it with considerable fortitude.

The last days of this great inventor were spent in comparative wealth and tranquility of mind. Long after he retired from business, he kept on inventing for his own amusement; and he used his tools, bench, workshop and leather apron to the very last month of his life. At 81 years of age, he invented a machine for copying busts, and his first production in this line he presented to a friend, remarking, with his usual quiet humor, "by a young engraver in his eighty-second year." He was also the inventor of the copying-press, an invention now universally used. He could construct a telescope, a parallel ruler, an organ, a violin, a clock, a bridge, and a steam engine with equal facility. He was undoubtedly the greatest mechanic that ever lived, and his knowledge on all subjects was wonderful. He could speak and write French, German and Italian; he understood music, chemistry, anatomy and geometry; in short, he was a prodigy; yet he was a most modest, honest and kind-hearted man. He was offered a baronetcy by the king, but he refused the honor—it could not add to his fame or character. He did more for the world than all the generals and statesmen that ever lived; and although several monuments have been erected to his memory since his death, which occurred on the 18th of August, 1819, yet he needed them not. Wherever we see a steam engine, there is a monument to James Watt.—*Scientific American.*

FIRST USE OF ILLUMINATING GAS IN AMERICA.

It is claimed that gas was first used for lighting buildings in Rhode Island. On the 13th of November, 1813, David Melville, of Newport, and Winslow Lewis, of Boston, announced that they had become proprietors of a patent

issued by the President of the United States, of an improved gas lamp for lighting manufactories, mills, mines, theatres, etc., with hydrogen gas or inflammable air, produced from pit coal. The proprietors asserted that the new light was safer, more agreeable, and less expensive than any other, and that there was no danger from sparks or the use of snuffers, as was the case in the use of oil lamps and candles. Insurance rates would thus be lowered, and a great saving would be secured to the manufacturer who used the new gas light. Persons were referred to a building in Newport, R. I., in which the new system was in successful operation, and also the cotton manufactory belonging to Seth Bemis, at Watertown, Mass. They further stated that the patentee had just (November 13, 1813) placed the new system in the Wenscutt factory, one and a quarter miles from Mill Bridge, which mill was brilliantly illuminated every evening. Gentlemen interested in cotton mills were urged to visit these places and inspect the new invention. The proprietors offered to furnish the necessary apparatus for any number of burners at ten days' notice.

The Arkwright mill, then principally owned by Mr. James De Wolf, was also lighted by gas under this patent. The works were erected under the superintendence of Mr. Melville. This, however, must have been subsequent to the Wenscutt works, since, had the works at Arkwright been in operation at the date of Mr. Melville's advertisement, he would undoubtedly have referred to that mill instead of Mr. Bemis', at Watertown, and the building at Newport; unless, indeed, the fatal accident which happened at Arkwright induced Mr. Mellvile to suppress the fact. The story of the accident seems to be as follows: Mr. Abraham Churchill, employed in the capacity of watchman, saw what he thought to be a light moving about the mill about ten o'clock in the evening; he, therefore, took an old-fashioned tin lantern, punched with holes, and containing a tallow candle, and with this proceeded to examine the mill. He found nothing wrong about the mill, and went to the building adjoining, which contained the gasometer. Entering this building, he removed the candle from the lantern, and, holding the flame to the mouth of a large stop-cock, turned on the gas. The flames were instantly drawn within the gasometer, which exploded, destroying the building, and so injuring Mr. Churchill that he died the following morning. He was undoubtedly led to this act by seeing Mr. Melville perform a similar experiment. Mr. Melville had constructed a tube on the top of the gasometer, from which, on removing a plug, a jet of gas would escape. This jet he would light, thus throwing up a flame two or more feet high, to the delectation of spectators. But Mr. Melville was always careful to see sufficient pressure applied before ignition. This lack of pressure was probably fatal to Mr. Churchill.

The gasometer was never rebuilt at Arkwright, and one can readily conceive the effect of such an accident on the new enterprise. In England gas was used in partially lighting a mill as early as 1798, and a mill at Bolton, England, was fully lighted in 1805. The London Gaslight Company soon followed, in 1810. So that it is probable that Mr. Melville's process came from England, and, with the collapse at Arkwright, went out in Rhode Island for many years. — *Iron Age.*

ORIGIN OF STREET LAMPS.

Street lamps are of comparatively recent origin, for the practice, now so prevalent, of lighting the streets of large cities, can hardly be said to have existed at all previous to the middle of the sixteenth century, at which time the inhabitants of Paris were ordered to keep lights burning before their houses during the night, as the city was then much infested with street robbers. There is no evidence that Rome made any provision for illuminating its streets. Flambeaux and the lantern were the Roman's only guiding-stars on his way home from a carousal or a nocturnal visit. At Antwerp, however, as early as the fourth century, some of the principal streets had lamps suspended from the baths and public buildings; and on occasions of sorrow these lamps were left unlighted. Paris was first generally lighted in 1558, when the municipal authorities caused *fallots* to be erected at the corners of the streets. These *fallots* were vases filled with wood, pitch, rosin, and other combustible material. They were in a short time superceded by lanterns, which were few in number and very unsatisfactory in their service. In 1662, an Italian named Landati, entered into a curious speculation. He obtained the exclusive privilege of erecting booths or posts, where anybody might hire a link or lantern, which he might carry—or, by paying an extra sum, have a person to carry it for him. A regulated hour-glass was carried with each lantern. A few years later the stationary lantern was improved in form and extended in use. About the middle of the last century, the lieutenant of police offered a premium for the best street lamp; and the "reverberating lamp," as it was called, was the result. It was suspended from a string stretched across the street, and had sufficient height for vehicles to pass under.

The inhabitants of London were ordered to hang out lanterns before their houses in 1668; and in 1690 the order was such that every housekeeper had to hang out a lamp or light every night as soon as it was dark, between Michaelmas and Lady Day, and these lights should be kept burning until midnight. The Common Council, in 1716, ordered that every housekeeper, whose house is fronted on the street, should, on every dark night hang out one or more lights, with sufficient cotton wicks to burn from six to eleven o'clock under penalty of one shilling. A few public lamps were set up by the corporation about this time, and housekeepers who had no light had to pay a small rate. In 1736 an act was passed for setting up a sufficient number of street lamps of glass, to be kept burning from sunset to sunrise the year round. Amsterdam was lighted previous to this time, and so was Copenhagen. The Hague, Venice, Messina, Palermo, Hamburg, Madrid, and other places, adopted the custom at various periods during the seventeenth century. At Rome the streets were not lighted as late as the latter part of the last century. At Berlin the owners of every third house at first hung out lights, and took turns at it. In 1792 Mr. Murdoch, of Redruth, obtained inflammable gas from various substances, and in 1797 he lighted the Soho manufactories with gas procured fi a coal. In a short time the theatres, the large factories, and then the better class of shops, were lighted with the gas. Gas-works were established, pipes were laid in the streets, and finally the old street lamps gave way to the more brilliant and less troublesome gaslights.

AUTOMATON MECHANICAL WONDERS.

Automaton figures, or Androides, made to imitate human actions, are of early invention. Archytas, of Tarentum, a renowned mathematician and mechanic, who redeemed Plato, when sold as a slave by Dionysius, the younger, about 400 years B. C., made a flying dove, which is mentioned by several classic authors. But the earliest automata are the tripods, moved on living wheels and instinct with life, which Homer describes Vulcan as having made. Next are the curious creations of Daedalus — walking and even dancing statues, and a wooden cow which moved and gave milk.

In later times, Friar Bacon is said to have made a brazen head which spoke. This was made A. D., 1264. Alpertus Magnus spent thirty years in making another. A coach and two horses, a page, and a lady inside, were made by Camus, for Louis XIV. when a child. The horses and figures moved naturally, variously, and perfectly. They were made in 1649.

Vaucanson made an artificial duck, which performed every function of a real one, even an imperfect digestion— eating, drinking and quacking. Vaucanson also made a flute player in 1738. He undertook to make a machine, or automaton, to display all the mechanism of the circulation of the blood, the veins and arteries of which were to be of gum elastic; but in his day the art of rendering India rubber plastic was unknown, so the scheme fell through.

In the fifteenth century, a German named John Muller Rigio Montanus made an eagle and a fly of iron. The eagle is said to have flown from the city of Konigsburg, saluted the Emperor, who was marking his entrance, and returned to his maker. The fly, it is recorded, would soar about the room, with a buzzing sound, and, after a minute or two, alight upon his maker's hand.

In the middle of the last century, two philosophical mechanics, named Droz (father and son), made some wonderful automatons in Paris. The father made the figure of a child seated at a desk, which dipped its pen in the ink and wrote in French from dictation. The son made a female piano-forte player, which sat down to the harpsichord, played several tunes, followed with her eyes and head the notes on the music-book, and at the close rose and saluted the audience.

A number of years after this, Maillardet exhibited a female figure which, seated at the piano, played for an hour, moving the fingers and eyes naturally, and imitating breathing by a gentle heaving of the breast. With this he exhibited a humming-bird coming out of a box, perching on a bough, moving wings, breast and eyes, and opening its beak as if to emit song, its little throat moving all the time. At the same time he exhibited the figure of a boy kneeling on one knee, and holding a pen in his hand, with which he wrote and made various drawings. He had also made a mechanical tumbler — a little image about two inches high, inclosed in a glass case, the lower part of which contained the mechanism. When this figure was set in motion it threw itself into a variety of elegant and grotesque attitudes, dancing to music produced by the machine.

In 1809, M. Maetzel, a fine mechanic, made a trumpeter for the Emperor of Austria, which was exhibited at Vienna, and played the Austrian and French cavalry marches with great skill. But M. Vaucanson's flageolet-

player, constructed in 1741, was wonderful. It produced music from a flageolet held in one hand, while the other shook a tambourine.

In 1269, Roger Bacon, one of the finest scholars of his age, suggested the reformation of the calendar, invented the magnifying glass, and is believed to have discovered that charcoal, sulphur and saltpetre, mixed in certain proportions, would produce thunder and lightning. He also made a brazen head which spoke, but it was accidentally destroyed by some ignorant or superstitious person, who was alarmed when, in a deep voice, it uttered the Roman oracular words, "Time is; Time was; Time will be."

One of the most remarkable pieces of mechanism ever made, was known as the "Automaton Chess Player." It was made by Wolfgang de Kempelen, a Hungarian, who, seeing some curious magnetical performances exhibited at Vienna, in 1769, told the Empress Maria Theresa that he thought he could contrive something which would throw these apparent wonders into the shade. She was excited by this boast, and desired him to try it. In six months he produced the "Automaton Chess Player."

For many years Kempelen refused to exhibit it in public, though he frequently showed it in the Empress' private rooms in Vienna. He also declined many offers to purchase it, and at last took it to pieces.

The Grand Duke of Russia having visited Vienna, he was requested to show the figure to him. It excited so much wonder that he was again urged to make money by exhibiting it in public. He consented, and showed it in nearly every great city of Europe. On his death, in 1819, the automaton was sold, after which it was taken to the United States, where it has been seen by thousands.

The so-called automaton resembled a Turk, full-sized, dressed in Oriental costume, and seated behind a box resembling a chest of drawers. Before proceeding to action, the exhibiter opened several doors in the chest, which revealed a large army of wheels, pulleys, cylinders, springs, etc. The chessmen were taken from a large drawer, and a cushion was placed on the table for the Turk to rest his right arm upon; the left hand, somewhat raised, held a pipe. When the doors were opened, a lighted candle was placed within the cavities thus displayed. This removed, and the doors closed, the exhibiter wound up the works, placed the cushion under the right arm of the figure, and challenged any one to play.

The Turk always played with the white men, and made the first move. The hand and fingers opened on touching the piece, which it firmly grasped and placed on the proper square. Then the living antagonist moved *his* piece; after which, pausing for a few moments, as if to study the game, the Turk moved another piece. On giving check to the king, the figure shook its head. Sometimes, to try it, the human player made a false move. The figure never allowed this to pass unnoticed, but tapped on the chest or box in an apparently impatient manner, replaced the piece, and punished the adversary by taking the move for itself. If the human player was too long considering his moves, the automaton tapped smartly on the chest with the right hand, as if to desire him to "hurry up." All through the game the whizzing sound of machinery in motion was audible.

While Mr. Kempelen retained the

automaton, the figure invariably won the game. After it had passed, on his death, into the possession of M. Maetzel, it was frequently defeated, though its play was always good.

When the game was ended, the Turk moved the knight, with its proper zigzag motion, from the square it occupied, over the other sixty-three squares of the board, in turn, without missing a single square, or touching any square a second time.

It was long doubted whether this really was a mere automaton. It was observed that, in winding up the clock work, the key never went beyond a certain number of revolutions, whether the game was long or short. Sixty-three moves had been made without winding up, and once, in a moment of forgetfulness, the figure played without any winding up after the last game.

The original story as to the history of this machine was, that it had been constructed to permit a Siberian exile to escape from Russia, by being concealed within, and that, being a dwarf, this was easily done. But it was made in Vienna, and when the mystery was disclosed, it appeared that there really was room, notwithstanding the apparent show of wheels and machinery, for a man to sit in, with a chess-board before him, on which, by mechanical arrangement, each move made by the figure was instantly repeated, each return move made below being equally repeated on the squares above. Of course the concealed player was always an expert.

Sir David Brewster, inventor of the stereoscope, wrote an article upon the automaton chess-player, in which he proved, by measurement and diagrams, that a man *must* be concealed within the box, to make the play of the Turkish figure. After he had made this disclosure, it was confessed that his philosophical and practical conjecture had been true.

THE INVENTOR OF THE CIRCULAR SAW.

In a lonely, secluded position in the northwest corner of the cemetery near the village of Richmond, Kalamazoo county, Michigan, the historian can find, on a pure white marble slab, nearly concealed from view by a large cluster of lilac bushes, engraved the simple name of Benjamin Cummins, born A. D., 1772, died A. D., 1848." And who was Benjamin Cummins? He was the inventor of circular saws, now in use in this country and in Europe. Nearly sixty years ago, at Burtonville, N. Y., near Amsterdam, this man hammered out, at his own blacksmith's anvil, the first circular saw known to mankind. He was a noted pioneer in Michigan, a first cousin to one of the Presidents of the United States, a slave-owner in New York State, a leading Mason in the days of Morgan, and at whose table the very elite of the then great State of New York feasted and drank freely of his choice liquors and wines. A vessel-owner on the North river before the days of steamboats, a captain in the war of 1812, where, after having three horses shot under him, with one stroke of his sword he brought his superior officer to the ground for an insult and because he was a traitor and a coward, and after having been court-martialed, instead of having been shot, he was appointed a colonel in his place. And in this lowly grave are the ashes of the man who, nearly seventy years ago, at Albany, N. Y., took up and moved

bodily a large block of brick buildings, and, to the wonder and astonishment of the world, constructed a mile and a half of the Erie canal through a bed of rock, and who also built, per contract, those first low bridges over the same. He also aided in the construction of the first ten miles of railroad built in the United States, and founded both the villages of Esperence and Burtonville, on the old Schoharie, near Amsterdam. The study and aim of this man's life appeared to be to accomplish that which none others could accomplish, and when the object sought was secured, or overcome, he passed it as quietly by as he would the pebbles on the sea-shore.

A HISTORY OF GLASS.

Another remarkable proof of the high antiquity of the art of glass making, and of the early perfections of which it boasts, is exhibited in a large plate of glass which was found at Herculaneum, an ancient city in Italy, which was destroyed by an eruption of Vesuvius in the year 79. From Syria, where, as already mentioned, the manufacture of glass was first established on an extensive scale, or something like system, it gradually traveled west. The Greeks acquired it, and from thence it found its way to Rome; but its march was slow, and for many centuries the Romans were supplied from Alexandria. The shape in which it was imported, however, still bespoke a limited knowledge of its use. The shape was principally ornamental, and in rare cases it extended to drinking cups, or glasses, but these were deemed fit only for a king; and, though an excellence in coloring glass was attained at this early period, and long before, which is not yet surpassed, the art of producing it free from any color — the most difficult part of the process of glass making, since it was readily effected by extraneous substances — was scarcely known. We are told that the Emperor Nero paid six thousand sesteria (a sum nearly equal to $250,000) for two drinking cups, whose value chiefly arose from the circumstance of their being entirely colorless. The poorest person of the present day drinks out of glasses in which this property is perfect. The glass imported into Rome from Alexandria was, as already noticed, principally ornamental, and all colored; but this coloring is so exquisite, and the workmanship otherwise of these little frail toys so beautiful, that they were used and valued as jewels, and so employed in adorning the persons of the ancient Roman belles and beaux; and a string of glass beads, which no servant girl now would wear, was considered an ornament to which only the daughter of a patrician could pretend.

From Venice the art of glass-making found its way into France, where an attempt was made, in 1634, to rival the Venetians in the manufacture of mirrors. The first essay was unsuccessful; but another, made in 1665, in which Venetian workmen were employed, had better fortune, though in a few years afterwards, this establishment, which was situated in the village of Tourlaville, near Cherbourg, in the lower Normandy, was also threatened with ruin by a discovery, or rather improvement, in the art of glass-making, effected by one Abraham Theverat. This improvement consisted in casting plates of much larger dimensions than had been hitherto thought practicable. Theverat cast his first plates in Paris, and astonished every artist by their

magnitude. These plates were 84 inches in height and 50 in breadth, while none before had ever exceeded 45 or 50 inches in length. Theverat was bound by his patent to make all his plates at least 60 inches in length and 50 in breadth. The two companies—Theverat's and that at Tourlaville—united their interest, but were so unsuccessful, that in 1701 they were unable to pay their debts, and were, in consequence, compelled to abandon several of their furnaces. In 1702 a new company was formed under the management of Antoine d'Agincourt, which realized handsome profits to its proprietors, a circumstance which is attributed wholly to the greater prudence of d'Agincourt.

We are told that, early in the 14th century the French government made a concession in favor of glass-making, decreeing not only that no derogation from nobility should follow the practice of the art, but that none save gentlemen, or the sons of noblemen, should venture to engage in any of its branches, even as working artisans. This restriction was accompanied by the grant of a royal charter of incorporation, conveying various important privileges, under which the occupation became, eventually, a source of great wealth to several families of distinction, whose descendants have attained some of the highest dignities of the state.

The exact period when the art of manufacturing glass was first introduced into England is not easily determined. As already mentioned, it is said to have been brought into that country in 1557; bu. we have stated a circumstance wh.ch, we conceive, leaves little doubt t.at glass was manufactured there at a much earlier date. In 1557, however, it certainly was manufactured in England. The finer sort of window glass was then made at Cretched Friars, in London. The first flint glass made in England was manufactured at Savoy House, in the Strand, and the first plate glass, for looking-glasses, coach windows, etc., was made in Lambeth, in 1673, by Venetian workmen brought over by the duke of Buckingham.

The date of the introduction of the art of glass making into Scotland is more easily determined, because of more recent occurrence. It took place in the reign of James VI. An exclusive right to manufacture glass within the kingdom for the space of thirty-one years, was granted by that monarch to Lord George Hay, in the year 1610. This right his lordship transferred, in 1627, for a considerable sum, to Thomas Robinson, merchant tailor, London, who again disposed of it for £250, to Sir Robert Mansell, Vice-Admiral of England. The first manufactory of glass in Scotland, an extremely rude one, was established at Wemyss in Fife. Regular works were afterward established at Prestonpans; and at Leith glass works, January 7, 1747, a vessel was made of the extraordinary capacity of 105 imperial gallons. A neat pocket pistol for the moors.

THE GLASS OF VENICE.

It may appear strange, but it is true, that with all our improvements and inventions our ancestors did certain things that far surpassed anything we can produce in the same way, and in fact, our modern novelties are often but the result of searches after lost arts and dead knowledge. Thus it is with the glass manufacturers of "the bride of the sea," artistic Venice. Although her wondrous story seems one of fable, and the Doge with

his retainers has now forever passed away, yet, in the public museum of art and in the cabinets of connoiseurs, (which being freely translated means "knowing gentlemen,") there are to be seen evidences of her industrial art and her workmen's skill. In very early times her glass manufacture was celebrated; and when in the thirteenth century, the Venetian Republic aided in taking Constantinople, she made good use of the conquest by learning secrets from Eastern nations concerning the manufacture of colored glasses and enamels. At the commencement of the sixteenth century, the filagree glass-work was introduced on the island of Murano, where the furnaces were placed, and a goblet of this manufacture has been bid $1,000 for. This filagree work, though well understood by our manufacturers, is seldom made, for, from some cause, the delicacy of the Venetian tints and threads seems to be again unattainable. It was produced by making thin rods of glass by imbedding strings of colored glass or opaque white glass in colorless glass, and these thin rods were heated, and then blown, twisted and welded, and then moulded into goblets, vases and jugs. The effect is very pretty and unique, the stem and thick parts presenting a mass of varied colors, which gradually thin and spread out in the form of the vessel, which seems to be made up of a series of colored curves that harmonize with the design of the goblet. It is an exceedingly elegant manufacture, and might, we should think, be advantageously revived in another republic whose flag is composed of stars and stripes.

THE first public library was founded at Athens, 526 B. C.

GLASS.

Plate-Glass is so named from the mode of its production, which consists in placing the materials in an iron pot or crucible, and subjecting them to a degree of heat needed to render them fluid, and then pouring upon a cast iron table, the thickness being equalized by passing a heavy iron roller over the mass while in a liquid state. The size of the glass is regulated by the size of the table, or the several divisions into which it is separated. When sufficiently annealed, the surface of the plate is ground down and finely polished by friction, two slabs of glass being briskly rubbed together for this purpose. The best glass plate is polished on both sides. This invention is said to have originated with a Frenchman named Colbert, "blow-glass" having formerly been used both in Venice and other leading marts for the production of mirrors, and other purposes for which plate-glass is now used. The best French-plate has a very smooth and faultless surface, and is distinguished for its brilliancy, clearness and strength.

Rough plate-glass is cast by a process in all respects similar to that before described, only it remains unpolished. It is used for skylights, some times for flooring also, and other similar purposes. It was formerly the practice in Great Britian to sell glass by the superficial foot, according to thickness, but without regard to size; but latterly the price is regulated by the size, the same as other descriptions of glass. Its length seldom, if ever, exceeds ten feet, and its thickness one and one-half inches; but it can be obtained in all makes of length and thickness below the extreme.

Polished plate glass is usually from

3-16 to ¼ inch thick, unless an extra thickness is specified; special prices being asked for additional thickness. It can be had up to sixty superficial feet in one square, the price increasing per foot, according to the size. It is a custom with the trade to charge any fraction of an inch, when the glass exceeds a certain size, as a full inch. If the size runs small or irregular, the cost is proportionately greater. Two other kinds of plate glass are manufactured, known respectively as patent plate and patent rolled plate. The former is blown in what is termed a "muff," and then cut and spread into a sheet. The latter variety is run into an iron mould, and then perforated by thin plates of iron wherever it is deemed desirable. Rollers of a peculiar pattern also give it a ribbed surface, from which this brand of glass receives its name.

Crown glass is a variety for the most part used in England alone. Its process of manufacture consists in rapidly pouring the material at a particular state of fusion on a flat table of about five feet in diameter, and subsequently annealing in an oven. It is divided into best, second, third and fourth quality. The common or small squares under 7 by 9 are called quarries, and are used as a cheap window in ordinary lead or wooden casements. The maximum size of the best crown glass is about 5 superficial feet per square. Extra thickness is charged an advanced price of twenty to twenty-five per cent.

Sheet glass is blown in a mould, and then cut and spread into sheets, as its name indicates. It is made in various degrees of thickness, according to weight, commencing at 15-oz., and going up to 42-oz.; the price ascending with the greater weight. It is also supplied in plates, varying from about 3 feet 6 inches by 2 feet 6 inches, up to 6 feet by 3 feet 6 inches. Extra sizes, if wanted, are made by special contract. Glass when imperfectly compounded changes color by lapse of time and exposure to the atmosphere. It takes on tints of green, purple, yellow, or else becomes extremely dull or cloudy in appearance.

Within the last three months there has been a material advance in French plate and sheet glass, and prices still tend upward; the rise is said to be attributable to the demands of operatives for higher wages, a diminished production consequent upon the recent war, and a more liberal demand from England, the United States and other foreign countries. Efforts have been made from time to time to manufacture plate glass in this country, and with considerable success; but the ingredients are not usually found in sufficient quantities near together to make the business very profitable. Besides, corundum, one of the components, is only thus far obtained in this country in small quantities in North Carolina, the greater part of it being imported.

ABOUT LOOKING GLASSES.

The manufacture of good looking glasses, for some unaccountable reason, has never been successfully transplanted to this country. Our sands are much superior to the European. England now draws a large proportion of her supply of this material from Australia, showing that the best European sand has already been used. The sodas manfactured in this country are as cheap as those of Europe; and we have coal in abundance. But, not-

withstanding all this, we still rely almost entirely upon the European factories for the best quality of mirrors.

The modern history of mirrors dates from 1688, when Abraham Theverart, a French artist, conceived the bold idea of casting glass in the way practiced with metals. By employing this process, a very great reduction was made in price, and the new manufacture was carried on with marked success. In 1691, the establishment now under the direction of a company was transferred to St. Gobain, where it exists to this day, in the enjoyment of a green old age.

St. Gobain, by the beauty of its glasses, by their relative cheapness, and by the ability of its managers, has retained the monopoly, almost exclusively, of the French market, and has, besides, maintained a rank abroad not excelled by other factories, notwithstanding the active competition of Belgium and England. This factory has six strong competitors in England, especially in looking glasses used for windows. The most important factory of the continent, after St. Gobain, is situated at Sainte de Marie d'Oignies, near Charleroi, Belgium. In 1860, St. Gobain alone manufactured 200,000 square metres; the six English factories, 350,000 metres; Belgium, 110,000, and Manheim, 70,000.

The French looking-glass factories employ 5,000 workmen in the manufacture of the glass proper, and of course there are thousands more employed in the various branches of business dependent upon this industry. The process of manufacture has been so much improved that prices are to-day fifty per cent. lower than twenty years ago, and thirty-two per cent. lower than five years ago.

The great St. Gobain Works, in France, manufacture their own sodas, emery, colcothar, and tin sheets. They buy their tin in Amsterdam, from the Dutch East India Company. This company only sells at wholesale. They get the mercury from Spain. These facts show the advantage of a location on the ocean border. We will give an example of these advantages. Sodas must be made on the spot, and thereby an important saving made in freight expenses, as soda is obtained from sea salt by transforming it into sulphate of soda, then the sulphate into carbonate. In this latter state it contains a large quantity of water—from 52 to 66 per cent.—so that 190 pounds of this salt represent only 34 to 38 per cent. of dry carbonate of soda. A factory making this carbonate on the spot, would save the freight not only of the pure carbonate, but also of the six-tenths of water it contains.

A HISTORY OF THE CANARY.

The canary, as its name implies, was a native of the Canary Islands. Its color, originally, was a greenish gray. Domestication has completely changed it. The canary was first known to Europeans early in the sixteenth century, but it owes its general introduction to an accident. A trading vessel sailing to Leghorn from the Canary Islands brought a number of these birds among its cargo. In a violent storm off the Mediterranean island of Elba, the vessel was wrecked, and the birds took refuge on the island. The climate was favorable, they kept hardy and strong, and presently all Europe went to the importation of canaries until they became extirpated from their native country. The mountain-

eers of the Hartz country had been raising birds for a long while, and they became interested in canaries, and took the lead in their culture. You see, these mountaineers lived in a wooded country, where birds abound. By degrees they began to cultivate birds, and now every farmer and shepherd has a great room in his house where he raises birds. The women attend to them during the day, and the men assist when their other work is finished. At first, canaries were taught to sing by association with other songsters, nightingales and skylarks, whose tunes they caught; and then the German people used to sit in the room with the birds and play to them on pipes. Thus the canary learned a song that is composed of many other songs —the bow-trill, the bell-note, the flute, the water-bubble, the nightingale's note, and the woodlark and skylark note—and a canary must have all these combinations to be perfect and valuable. The Hartz mountaineer is an excellent judge. No noisy bursts of song for him. He must hear every note of the octave sweetly and regularly touched, creating a long, swelling, harmonious air, and a bird who can't do this is not allowed to be near the others. They would hear and catch his defects. So much for the training.

Now this is how we buy the birds: Our agents are in Europe all the time. They make their headquarters at some of the little cities at the foot of the hills—at Nordhausen, Duderstadt, or Northein. There are women there who go about from house to house all over the mountains, buying birds, and when they have filled the great crate which they carry on their backs, they return to the city from whence they started, and sell their birds to the agents. I dare not tell you what they cost—it is not a great deal—but the importation is very expensive. The agents take the birds to the nearest seaport by rail, and then they engage double as much room as the birds take up on the steamer, so that they can handle them; every bird must be given food and drink every day. One million are sent away annually, and one house in New York sells forty thousand a year. The average bird brings $4, but a splendid singer will sell for $6 or $7. It is an erroneous idea that the dark canaries are the best singers. The best singers are those that are raised on the tops of the mountains. They are hardy and their voices are rich and strong. The city of Nordhausen supplies the most valuable canaries. Those from the valleys are always inferior; and this rule applies to all the songsters from the Hartz region. The long breeds, or Belgium canaries, famous for their size and shape, are next to the German birds in popular favor, but they rarely ever sing well.

ORIGIN OF PRINTING.

Like all grand discoveries, the origin of printing was exceedingly simple. In the year 1420, a certain old gentleman named Lawrence Coster, lived in Haarlem. He was fond of taking solitary walks in the woods, and one day fell idly to work with his knife on a smooth piece of birch bark, and cut several letters so neatly that after his return home he stamped them on paper; the impression was so good that he naturally fell to thinking of what might be done with such letters cut in wood. By blackening them with ink, he made black stamps upon paper; and by dint of much thinking

and much working, he came, in time, to the stamping of whole broadsides of letters — which was really printing. The Dutch writers claim that this grand discovery did poor Coster very little good, as a dishonest apprentice, who had wit enough to understand the value of such a discovery, ran away from his master, taking with him a great many of the wooden blocks, which it had required so much ingenuity and patience to fashion, and unlawfully appropriated the credit of the grand discovery. It is hinted that the runaway apprentice was John Faust or John Gutenberg; but the Germans justly say there is no proof of this. "It is certain, however," says a contributor to one of our first-class journals, "that there was a Lawrence (Custos, of the cathedral) who busied himself with stamping letters and engraving. His statue is on the marketplace in Haarlem, and his rough looking books are, some of them, now in the 'State House' of Haarlem. They are dingy, and printed with bad ink, and seem to have been struck from large engraved blocks, and not from movable types. They are without any date, but antiquarians assign them to a period somewhat earlier than any book of Faust, or of Gutenberg, who are commonly called the discoverers of printing. As usual, it was for future ages to reap the full benefit of the art of one patient, unappreciated worker."

THE INTRODUCTION OF PRINTING IN AMERICA.

It is an enduring honor to the memory of the first settlers in New England, the Pilgrims, that the diffusion of knowledge belonged to the subjects of their earliest care. Only 18 years after they first set foot on Plymouth Rock, they established, in 1638, the first printing press on the North American continent, at Cambridge, while the first publication was made by Daye, in 1639, entitled *The Freeman's Oath.* This Daye had been engaged by Jos. Glover, a rich nonconformist preacher, who came from Europe with a stock of printing material, and died on the passage. An old marine commander, William Pierce, edited an almanac in the same year, and in 1640, Revs. Weld and Eliot edited "The Psalms, newly turned into Meter," and its sale was an eminent success, passing through 70 editions in 114 years; it was reprinted in England and Scotland. Other religious books appeared, and in 1641, a book entitled "The Body of Liberty," containing one hundred laws of the colony.

Daye, who was a very deficient compositor, as proved by his technical blunders, was superseded, in 1649, by Samuel Green, who sometimes is called the first printer in America, while Daye obtained 300 acres of land from the court of Massachusetts, for "being the first that set up printing."

We find next, poems by Anne Bradstreet (wife of the Governor), which were reprinted in England, and several other works of a smaller kind, as well as religious works, which we will pass over.

In 1653, a catechism was printed in the Indian language, by Eliot, for the benefit of the Indians, while in 1654, a beginning was made to print regularly all laws made by the court, from 500 to 700 copies, to be paid for "in wheate or otherwise," at the rate of a penny a sheet, and a copy to be distributed to each freeman in every town.

In 1655, a second press, with furniture and material, was imported from England, and in 1659, the psalms were printed in the Indian tongue, while the first American edition of the Bible was issued in 1661 and 1663.

Next to printing comes book-binding; and the first book-binding of any account was that of the Bibles printed; to give the reader an idea of the slowness proceeding from want of proper system, and improved tools, it must be said that the best binder could only bind one Bible per day, for which he wanted 3*s*. 6*d*., or 84 cents of our present currency, and then he had to supply his own material, thread, glue, pasteboard, leather, etc.

After the Bibles were printed, the corporation presented the whole printing establishment to Cambridge College, while the court of Massachusetts, either jealous of the influence of the press, or desiring to imitate England, appointed, in 1662, two licensers to watch its operation, and to determine what books it would be safe to print. Probably the true cause was, that two religious works had appeared, in which were some expressions of heretical tendency (Universalist opinions). Next an order came that no press should be allowed anywhere except at Cambridge, and nobody allowed to print anything without a special license from the court. As an example of the meddlesome spirit and intolerant feelings of the authorities at that time, it may be stated that after the censors had permitted the printing of Thomas a'Kempis' "de Imitatione Christi," it was found that some expressions did not conform to the orthodox belief; the press was stopped by the police, and the work carefully reviewed before permission was given to continue the printing.

The first copyright law was enacted in 1672, stipulating that no printer should print or sell any more copies than were agreed upon, and paid for by the owner, and next securing copyrights for seven years. In 1674, permission was given to John Foster to establish a second press in Boston, while the court at the same time appointed two additional licensers, Mather and Thacher, two orthodox divines, of which the latter wrote the first medical book published in America. It was on small pox and measles.

Then came the struggle in England for and against the liberty of the press. Contrary to the pleading of Milton for its freedom, the press was placed under a board of censors, and Governor Duncan, of New York, was instructed to "allow no printing press," while Berkeley, the Governor of Virginia, said, "I thank God we have no free schools nor printing, and I hope we shall not have these hundred years. God defend us from both." And when James the II. came to his throne, he sent Andros, in 1686, to Boston, to prohibit printing, but before he came, Randolph, the collector of customs, had already forbidden the printing of an almanac.

In 1690, Richard Pierce, of Boston, printed the first newspaper in the New World, but it was at once suppressed by the authorities, because it came out "contrary to law, and contained reflections of a very high nature." All the copies were destroyed; only one escaped, found its way to England, and is now among the colonial State papers in London; it bears the following date and imprint: "Boston, Thursday, Sept. 25, 1690. Printed by R. Pierce for Benjamin Harris, at the London Coffee House, 1690." The

publisher promises that the country "shall be furnished once a month (or if a glut of occurrences happen, oftener) with an account of such considerable things as have occurred unto our notice; to give a faithful relation of all such things to enlighten the public as to the occurrents of Divine Providence," the circumstances of public affairs at home and abroad, to attempt the curing, or at least the charming of the spirit of lying, then prevalent, and to aid in the tracing out and convicting the raisers of false reports.

The news consists of the departure of 2,500 troops and 32 sail of ships for Canada, the ravages of small-pox and malignant fevers in Boston. A fire broke out in Boston, which destroyed many houses, and caused besides loss of life, also that of "the best furnished press in America, a loss not presently to be repaired." The landing of King William in Ireland, with 14,000 foot and horse; and other news; it was, in fact, to all intents and purposes, a live newspaper, besides the very first of its kind in America.

WONDER OF NEWSPAPER PRINTING.

The New York *Herald* claims that a recent Sunday edition consisted of one hundred and fifty thousand copies. Each number consisted of twenty pages: that is, one hundred and twenty columns, of which seventy-eight were advertisements, and forty-two reading matter. The *Herald* says:

"A detail which will be perfectly new to non-professionals is, that to produce one hundred and fifty thousand copies, it is necessary to take nine hundred thousand impressions. To accomplish this in the short time allowed, five rotary Hoe presses, of eight and ten cylinders each, and two Bullock perfecting presses, were kept rolling off at the rate of one thousand a minute. To drive these huge presses, two large engines, of eighty horse power, were kept in motion by burning six tons of coal in the furnaces. To form the stereotype plates for the cylinders, eight tons of type metal were used to cast one hundred and forty-eight plates, weighing, when finished and dressed, thirty-eight pounds each. The ink on a single copy would not be taken into observation by the average observer, but it required seven hundred and twenty-five pounds to keep the rollers prepared to leave the imprint of their kisses on the eighteen million virgin pages that were to glow at daylight with the news. And these rollers were composed of five hundred pounds of glue, mingled with one thousand pounds of honey. Then the virgin pages — the paper on which all this is printed — passes, sheet by sheet, through the presses, handled by eighty men and boys, until seventeen tons, or thirty-four thousand pounds, are printed on both sides. If you were to pile those sheets one upon another, they would make a monument one hundred and twenty feet high.

SAGO.

Sago is the starch obtained in a peculiar manner from several kinds of palm trees in the Indian Archipelago, in Assam, on the Coromandel coast, and in Ceylon. It is in all cases produced from the large mass of pith that fills the stems; therefore it is necessary to cut the trees down. The stems are cut from one to two feet in length, split open and the pith dug out, cut small, placed in a trough and worked

in clean water to wash out the dregs; this makes the water white and turbid, and it is then run off into another vessel. Fresh washings of the pith take place until it ceases to yield any starch. The water of the several washings is put together and allowed to settle, when the starch is soon deposited. The clear water is then poured off and the deposit dried. This is the ordinary *Sago Flour* of commerce, of which large quantites are used for starching calicoes and other fabrics. When prepared for food it is either in the state called *Pearl or Granulated Sago.* The former is in small round grains of a pearly white color, varying in size from that of poppy seed to a grain of millet. The granulated is also in round grains but of a larger size, sometimes nearly as large as a pea. There are several varieties, differing considerably in color—some quite white, while others having the peculiar reddish brown of radish seed which in appearance they resemble very much. The Malays have a way of pearling and granulating their sago that the Europeans do not understand, but there are good reasons to believe that heat is employed, because the starch is partially transformed into gum. It is not easily dissolved in hot water like ordinary starch, hence it can be employed in making puddings, etc., and in this way forms a valuable article of food, being cheap, light, nutritious and easy of digestion.

The quantity of *Sago* and *Sago Flour* imported into the United States in 1874, was nearly 2,000,000 pounds, valued at $60,000. The quantity imported into Great Britain in 1867 was 16,700,000 pounds, valued at half a million dollars, most of which was consumed at home.

BROOM CORN---WHERE IT IS GROWN AND MANUFACTURED.

Broom corn, which is now one of the most extensive products of the land, was introduced into the country by Dr. Franklin. It is stated that, while examining a corn-stalk brought to him from Europe, he discovered a single seed, which he planted in his garden, and from which corn was propagated. Formerly, Massachusetts was the only State in the Union where this corn was raised, or the manufacture of brooms carried on to any extent. Boston, for many years, was the great point for the distribution of these manufactured goods. The raising of corn, and the manufacture of brooms, extended to nearly every one of the New England States, but now there is hardly an acre devoted to the broom-corn culture in that entire region. Since the war, farmers have raised tobacco in its place, as they find it more remunerative. Illinois is the largest producer of broom-corn at present; Ohio, Indiana, Iowa, Missouri, Tennessee and New York coming next. Chicago, Cincinnati and New York are the centres of business in this product, the latter city being the great depot of manufactured goods. There are two or three large manufactories in New Hampshire, and quite a number in Massachusetts, Pennsylvania, and New York, the smaller ones being located here and there.

The following figures, which are as correct as can be ascertained, show the quantity of broom-corn annually manufactured into brooms, in the Canadas and various States of the Union: Canada and Provinces, 1,050 tons; New England, 1,148 tons; New York, 4,400 tons; Michigan, 700 tons; Indiana, Illinois and Iowa, 1,350 tons;

Wisconsin and Minnesota, 750 tons; Ohio, 2,150 tons; Pennsylvania, 1,500 tons, and Maryland, 750 tons.

HOW TO CONSTRUCT AN ÆOLIAN HARP.

Make a box, with the top, bottom, and sides of thin wood, and the ends of 1½ inch beech; form it the same length as the width of the window in which it is to be placed. The box should be three or four inches deep, and six or seven inches wide. In the top of the box,—which acts as a sounding-board,—make three circular holes about two inches in diameter, and an equal distance apart. Glue across the sounding-board, about 2½ inches from each end, two pieces of hard wood ¼ inch thick, and ½ inch high, to serve as bridges. You must now procure from any instrument-maker, twelve steel pegs, similar to those of a piano-forte, and twelve small brass pins. Insert them in the following manner into the beech: First, commence with a brass pin, then insert a steel peg, and so on, placing them alternately ½ inch apart, to the number of twelve. Now for the other end, which you must commence with a steel peg (exactly opposite the brass pin at the opposite end), then a brass pin, and so on, alternately, to the number of twelve; by this arrangement you have a steel peg and a brass pin always opposite each other, which is done so that the pressure of the strings on the instrument shall be uniform. Now, string the instrument with twelve first violin strings, making a loop at one end of each string, which put over the brass pins and wind the other ends round the opposite steel pegs. Tune them in unison, but do not draw them tight. To increase the current of air, a thin board may be placed about two inches above the strings, supported at each end by two pieces of wood. Place the instrument in a partly opened window; to increase the draught open the opposite door.

MIGRATION OF PLANTS.

"Plants are seldom motionless. The wind wafts the seed of the dandelion. The waves bear the nut of the cocoa palm. Man has carried the apple and pear, the apricot and the peach, from the highlands of Asia to the far West. The cerealia have spread over all the world, and have become so cosmopolite that the land of their birth is unknown. Some plants almost seem to attach themselves to particular races. The common plantain is called by the North American Indians 'the White Man's Footstep.' Currents of air carry seeds and the eggs of insects and infusoria. To settle this formerly disputed question, a German philosopher, Unger, placed several plates of glass, carefully cleaned, between the almost air-tight double sashes with which he protected his study against the rigors of a fierce northern climate. Six months later he took them out, and examined the dust that had fallen on them, through imperceptible cracks and crevices, with a microscope. The result was that he discovered in the apparently inorganic dust the pollen of eight distinct plants, the seeds of eleven varieties of fungus, the eggs of four higher infusoria, and living individuals of at least one genus."

Observations like this go far to disprove the evidences of new created life, which are often discovered both in natural and artificial compositions. It

seems sometimes almost impossible to imagine how eggs or seeds could have either found admittance or retained vitality under circumstances where life appears, and it has not been deemed inconsistent with revelation to suppose the work of creation still going on. But such instances as above recorded induce a great reluctance to believe in newly originated life, and to induce a belief that the varieties of animals and plants which appear at intervals, are but modifications generated from pre-existing species.

STYLE IN THE OLDEN TIMES.

In 1782, Governor Hancock, of Massachusetts, received his guests in a red velvet cap, within which was one of fine linen, turned up over the edge of the velvet one or two inches. He wore a blue damask gown, lined with silk, a white satin embroidered waistcoat, black satin small clothes, white silk stockings, and red morocco slippers. The Judges of the Supreme Court of Massachusetts, as late as 1783, wore robes of scarlet, faced with black velvet; in Summer, black silk gowns. Gentlemen wore coats of every variety of color, generally the cape and collar of velvet, of a different color from the coat. In 1780, General Washington arrived in New York from Mount Vernon, to assume the duties of the Presidency. He was dressed in a full suit of Virginia homespun. On his visit to New England he wore the old Continental uniform, except on the Sabbath, when he appeared in black. John Adams, when vice-President, wore a sword, and walked about the street with his hat under his arm. At his levees in Philadelphia, President Washington was clad in black velvet, his hair powdered and gathered behind in a silk bag, yellow gloves, knee and shoe buckles; he held in his hand a cocked hat, ornamented with a cockade, fringed about an inch deep with black feathers; a long sword in a white scabbard, with polished steel hilt, hung at his hip.

RAILROADING IN EARLY DAYS.

When the Hartford and New Haven road was first opened, it had very meagre facilities; the road-bed was poor, had only strap-rails, which were all the time curling up and running through the car floors, and the cars were small and the locomotives weak. In fact, it didn't take much to block a train in those days. Sometimes an inch of snow on the rails would do it. Henry C. White, one of the first conductors on the road, tells how he and the baggage-master used to sit in front of the locomotive, one on each side, and brush off the snow from the rails with a broom as the train slowly crawled along. Each had a pail of sand, and sprinkled a handful on the rail when necessary. The driving wheels (engines had only one pair then) used to slip round and round, and torment them almost to death. On one occasion a train got "stuck" on the Yalesville grade by one inch of snow, and the wood and water gave out before the locomotive could overcome it. At last they got out the neighbors, yoked four pairs of oxen to the train, and drew it, passengers, baggage and all, into Meriden, with flying colors.

In the early days of the road, the stage coach drivers used to regard the cars with great contempt. Indeed, thirty years ago, the passenger trains were three or four hours on the road

to New Haven, and the stage coaches went in about the same time. Superintendent Davidson remembers riding with his father in a carriage drawn by two horses, in 1840, which had a race with a passenger train near Wallingford, where the turnpike and railroad are parallel for three or four miles, and during all that time the carriage kept even with the train. There were only two trains each way, daily, then, both carrying passengers and freight. The old cars were divided into three compartments, opened on the side, and had twenty-four seats.

The locomotive had only twelve-inch cylinders, and no cabs to protect the engineer and fireman from the weather. The oldest locomotives were the Hartford, Quinnipiac, Charter Oak and New Haven.

CURIOUS FACTS ABOUT CLOTHING.

Washing days at the times of the Tudors and Stuarts, though a little more important than in the preceding ages, had none of those unpleasantnesses and terrors which are said now to accompany them. Articles which required washing were "few and far between," whilst those of a texture which would not "stand a wash" were usually worn. The dyer was far more commonly employed than the laundress, and his trade thus covered a "multitude of sins" of omission of personal cleanliness which the laundress would have remedied with more healthy results.

Velvets, taffets, and rich silks were in the middle ages often worn by the wealthy without any underclothing whatever, while the domestics and people of lower order wore coarse woolen, also without underclothing. The possession of a linen shirt even with the highest nobles was a matter of note, and but few wardrobes contained them.

Under the Tudors' night-gowns were worn, though they had not been before; but they were formed mostly of silk or velvet, so that no washing was required. Anne Boleyn's night dress was made of black satin, bound with black taffeta, and edged with velvet of the same color. One of Queen Elizabeth's night-gowns was of black velvet, trimmed with silk lace, and lined with fur, and in 1568 her Majesty ordered George Bradyman to deliver "threescore and sixe of the best sable shymies, to furnish as a nightgown." In another warrant from her Majesty in 1572 she orders the delivery of "twelve yards of purple velvet, frized on the back syde with white and russet silks," for a night-gown for herself, and also orders the delivery of fourteen yards of murry damask for the "makyng of a nyght-gown for the Erle of Leycester." Night-dresses for ladies were, at a later period, called night-vails, and in the reign of Queen Anne it became the fashion for them to be worn in the daytime on the streets, over the usual dress. Night-caps were mostly of silks and velvets, and these, with the velvet night-dresses, the silken shirts, and other matters of a like kind, eased the laundress, though they must have added to the discomfort of the wearer.

AMERICAN INVENTIONS.

The cotton gin, without which the machine-spinner and the power loom would be helpless, is American. The power-shuttle, which permits an unlimited enlargement of the breadth of the web, is American. The planing-machine is American. Navigation by

steam is American. The mower and reaper are American. The rotary printing presses are American. The hot-air engine is American. The sewing machine is American. The machine manufacture of wool-cards is American. The whole India-rubber industry is American. The band-saw originated, we believe, in America. The machine manufacture of horse-shoes is American. The sand-blast, of which the large capabilities are yet to be developed, is American. The gauge-lathe is American. The only successful composing machine for printers is American. The grain elevator is American. The artificial manufacture of ice was originally invented by Prof. A. S. Twining, an American. The electro-magnet was invented, and immediately after its invention was first practically applied, in transmitting telegraphic signals, by Prof. Joseph Henry, an American. The telegraphic instrument introduced a few years later into public use, which has since obtained universal acceptance, was invented by Samuel F. B. Morse, an American.—

LOCOMOTIVE CAPRICES.

It is perfectly well known to experienced engineers that if a dozen different locomotive engines were made at the same time, of the same power, for the same purpose, of like materials, in the same factory, each of these locomotive engines would come with its own peculiar whims and ways, only ascertainable by experience. One engine will take a good deal of wood and water at once; another will not hear to such a thing, but insists on being coaxed by spadefuls and bucketfuls. One is disposed to start off when required at the top of his speed; another must have a little time to warm at his work and get well into it. These peculiarities are so accurately mastered by skillful drivers that only particular men can persuade engines to do their best. It would seem as if some of these "excellent monsters" declared on being brought from the stable: "If its Smith who is to drive, I won't go; if its my friend Stokes, I'm agreeable to anything." All locomotive engines are low-spirited in damp and foggy weather. They have a great satisfaction in their work when the air is crisp and frosty. At such a time they are very cheerful and brisk, but they strongly object to haze and mist. These are points of character on which they are united. It is in their peculiarities and varieties of character that they are the most remarkable.

THE PROCESS OF GILDING SILK.

The process of gilding silk, now used in some of the European tinsel factories, is thus described: It is first essential that the silk be of superior quality, free from knots and roughness. The gum must be boiled out of it, and it must be tinged to the shade of a light orange; it is then wound on bobbins, the end of the thread being passed over a wire, and subsequently, under a roller, which works in a trough containing a glutinous but transparent liquid. It is now made to pass over a reel attached to an endless screw or threaded spindle, so arranged that it lays on a brass cylinder the thread of silk, as cords are wound round the handle of a whip, without overlapping, until the cylinder is completely covered with the silk, when the thread is broken. The length of the

skein of thread depends, therefore, upon the size of the cylinder and fineness of the thread, but the cylinder cannot be of a size larger than can be spanned by a single leaf of gold. The cylinder being covered with silk in a gummy state, the book with the gold leaf is opened and laid on the palm of the hand; the machine — something like a turning-lathe — is moved; the edge of the leaf is made to touch the gummed silk, and it is quickly drawn round the cylinder, covering the silk. This is repeated, until the entire surface of the roller is covered with gold leaf. The next operation consists in fastening a piece of cloth or washed leather upon a slip of wood, something like a razor-strop; the roller is turned round and the strop pressed firmly upon the leaf, which not only attaches the letter closer to the silk, but separates it between each two windings of the finest thread. Thus one side of the finest thread is gilded. If gold and green, or any other color, is desired in combination, it is only necessary first to dye the thread the required color, and then, by gilding one side, the combination wished is secured. To gild the entire thread, it is simply necessary to wind the half-gilded thread on to another roller.

PAPER FOR TRACING.

Sometimes it is convenient to have tracing paper only temporarily transparent, and to obtain this, it is only necessary to wet the paper in benzine. After a time the benzine will evaporate, and the original opacity of the paper will be restored to it. In this way a design can be transferred to any part of a sheet of paper, without the necessity of employing regular tracing paper for the purpose.

SOUND.

In an airless world not a sound could be heard. A clock placed under the receiver of an air-pump in such a way that the striking of the clapper will continue after the air has been exhausted, is a practical example of this. While the receiver is full of air the sound will be quite audible; when the air is exhausted, there will be perfect silence. If the air be again introduced, there will be a slight sound, which will grow in intensity as the air becomes denser. At the top of the highest mountains the report of a pistol is scarcely louder than the noise of an ordinary fire-cracker, let off at the level of the sea. Above three miles in the air dead silence reigns. The whistle of a steam-engine can be heard ten thousand feet in the air. The barking of a dog six thousand feet; the shouts of a human being eight thousand: above sixteen thousand feet a sound rarely, if ever, reaches.

THE HUMAN BODY.

The muscles of the human jaw exert a force of 534 ℔s. The quantity of pure water which blood contains in its natural state is very great; it amounts to almost seven-eighths. Kiel estimates the surface of the lungs at 150 square feet, or ten times that of the external body. The blood is a fifth the weight of the body. A man is taller in the morning than at night to the extent of half an inch or more, owing to the relaxation of the cartillages. There is iron enough in the blood of forty-two men to make a plowshare of twenty-four pounds, or thereabouts. The human brain is the twenty-eighth part of the body, but in the horse the

brain is not more than the four-hundredth. The number of bones in the frame-work of the human body is 260, 108 of which are in the feet and hands, there being in each 27. The quantity of blood in adults is on an average 30 pounds, which passes through the heart once in four minutes. Only one-tenth of the human body is solid matter. A dead body weighing 120 pounds was dried in an oven, by way of experiment, till all moisture was expelled, when its weight was found to be but 12 pounds. Egyptian mummies are bodies thoroughly dried, and usually weigh about 7 pounds. The lungs of an adult ordinarily inhale 40 cubic inches of air at every inspiration, and if we breathe 20 times in a minute the quantity of air consumed in that period will be 800 cubic inches, or 48,000 inches an hour, and 1,152,000 inches in a day, which is equal to 86 hogsheads.

OBTAINING NEWS IN OLD TIMES.

David Hall, of the *Journal of Commerce*, was the first one to organize a plan to obtain news in advance of contemporaries. The old custom of obtaining news from incoming vessels, was to board them after they had come to anchor in the bay, and get the latest news and papers. These were taken to the offices of the papers and prepared for publication. Hall equipped a fast schooner, called the *Journal of Commerce,* and cruised for news in the lower bay. Whenever a ship hove in sight, he boarded her, got the news, and then crowded on all sail for the battery. While coming up, an editor on board the schooner would examine all the news, prepare his copy for the printer, and when the vessel touched the wharf, a messenger sped away with it to the office of the paper, and soon the news was made public, before the boats of other papers had reached the ship that brought it. Such enterprise was looked upon as a piece of great extravagance, that would soon ruin the newspaper indulging in it. But the result proved the wisdom of the action, in the increased circulation of the paper. This was the origin of the *Journal of Commerce, Jr.*, and of the *extra* paper, which is so peculiarly an American institution. Other journals soon followed in the steps of their successful rival, and soon a company was formed for the purpose of collecting the ships' news for the daily papers.

In 1813, Richard Haughton started the pony express, by means of which he was enabled to publish the election returns from every town in Massachusetts the morning following the day of election. Soon James Watson Webb established a pony express between Washington and New York, by means of which, news from the Capitol was published in New York only two days old. Now it is published before it is two hours old, and sometimes before it happens !

When the Long Island railroad was finished, Montauk Point was made a news-station, where incoming steamers were boarded, the foreign news received and sent to New York. Steamers now are met by the press-boats at Sandy Hook, and news telegraphed from there to the principal papers.

The origin of the word "newspaper," is not, as many suppose, from the fact of its containing new things ; but in a former time (1795 to 1830) it was the custom to put over the periodical publications of the day the initial letters of the compass, N. E. W. S., to

show that the journal has information from all quarters of the globe, North, East, West, South. Hence the use of the word NEWS before all papers of general information. —

HAIR SPRINGS.

Hair-springs, says a writer in the *Victoria Magazine*, are made in the factory, of finest English steel, which comes upon spools like thread. To the naked eye it is as round as a hair, but under the microscope it becomes a flat steel ribbon. This ribbon is inserted between the jaws of a fine gauge, and the dial hand shows its diameter to be two twenty-five hundredths of an inch. A hair plucked from a man's head measures three twenty-five hundredths — one from the head of a girl at a neighboring bench two twenty-five hundredths. Actually, however, the finest hair is twice as thick as the steel ribbon, for the hair compresses one-half between the metallic jaws of the gauge. A hair-spring weighs one-fifteenth thousandth of a pound troy. In straight line it is a foot long.

PRINTING IN CHINA.

Two pages are written by a person trained to the business, on a sheet of thin paper, divided in columns by black lines, and in the space between the two pages the title of the work and the number of the chapter and page are written. When the sheet has been printed, it is folded down through this space, so as to bring the title, etc., partly on each page. The sheet, when ready for printing, is pasted face downward on a smooth block of wood, made usually from the pear or plum tree. As soon as it is dry, the paper is rubbed off with great care, leaving behind an inverted impression of the characters. Another workman now cuts away the blank spaces by means of a sharp graver, and the block, with the characters in high relief, passes to the printer, who performs his work by hand. The two points that he has to be most careful about are to ink the characters equally with his brush, and to avoid tearing the paper when taking the impression. From a good wooden block some 15,000 copies may be printed, and when the characters have been sharpened up a little it is possible to obtain 8,000 or 10,000 impressions more.

PRIZE METHOD FOR KEEPING EGGS.

The *Farmer's Advocate* (London, Ont.,) recently offered a prize for the best method of keeping eggs over winter. The receipt given below took the prize: "Whatever excludes the air prevents the decay of the egg. What I have found to be the most successful method of doing so is to place a small quantity of salt butter in the palm of the left hand and turn the egg round in it, so that every pore of the shell is closed; then dry sufficient quantity of bran in an oven, (be sure you have the bran well dried, or it will rust); then pack them with the small ends down, a layer of bran and another of eggs, until your box is full; then place in a cool, dry place. If done when new laid, they will retain the sweet milk and curd of a new laid egg for at least eight or ten months. Any oil will do, but salt butter never becomes rancid, and a very small quantity will do. To insure freshness, I rub them when gathered in from the nest. Then pack them when there is a sufficient quantity."

FECUNDITY OF FISHES.

It is said that probably about 60,000,000,000 or 70,000,000 codfish are taken from the sea annually around the shores of Newfoundland. But even that quantity seems small when we consider that a single cod yields something like 3,500,000 eggs each season, and that even 8,000,000 have been found in the roe of a single cod! A herring six or seven ounces in weight, is provided with about 30,000,000 ova. After making all reasonable allowances for the destruction of eggs and of the young, it has been calculated that in three years a single pair of herrings would produce 154,000,000. Buffon said that if a pair of herrings were left to breed and multiply undisturbed for a period of twenty years they would yield a fish-bulk equal to our globe. The cod far surpasses the herring in fecundity. Were it not that vast numbers of the eggs and young are destroyed, fish would so multiply as to fill all the waters completely.

CHRONOLOGY OF GAS LIGHTING.

In 1659, Thomas Shirley communicated to the Royal Society some experiments on the gas issuing from a well near Wigan. In 1765, Mr. Spedding proposed to the Magistrates of Whitehaven to light the streets of the town with the above gas, but this proposal was refused, though he proved its practicability by using it to light his own office. In 1792, the first person who practically applied coal gas to the purpose of artificial illumination was William Murdock, who lighted his own house and office at Redruth, in Cornwall, with gas. In 1798, he lighted up part of the Soho Foundry at Birmingham. In 1802, gas-light was first used in Paris by M. LeBon. In 1805, lime was first used in the purification of gas, introduced by Mr. Clegg. In 1807, Pall Mall was lighted with gas by Mr. Winsor. In 1810 the London and Westminster Gas-light and Coke Company obtained their Act of Incorporation. In 1811, the hydraulic main was first used by Mr. Clegg. On December 31, 1813, Westminster Bridge was lighted with gas. The first practical application of gas-light in the United States was made by David Melville, at Newport, Rhode Island. The gas meter was invented in 1815 by Mr. Clegg, who in 1816 invented the gas-governor. In 1820, Paris was lighted with gas; Boston in 1832; New York in 1828; Philadelphia in 1835; Chicago in 1840; Cincinnati in 1841. David Melville, the pioneer of gas-lighting in America, died in the year 1856, at Newport, Rhode Island, in the 84th year of his age.

RELIGION OF OUR PRESIDENTS.

The question has been raised whether any one of our Presidents was a communicant in a Christian church. There is a tradition that Washington asked permission of a Presbyterian minister in New Jersey to unite in communion. But it is only a tradition. Washington was a vestryman in the Episcopal church. But that office required no more piety than it would to be mate of a ship. There is no account of his communing in Boston, or New York or Philadelphia, or elsewhere during the revolutionary struggle. Adams was a member of the parish in Braintree. He was High Arian. His attendance at worship was not very constant. Jefferson was an avowed skeptic, and

a devout admirer of Doctor Priestly. Madison and Monroe were moderate churchmen. John Quincy Adams was a professed Unitarian. He attended the services in the Representatives' Hall during the session of Congress. In the afternoon he worshipped in the Second Congregational church, where he had a pew. When Congress was not in session, Mr. Adams usually attended in the morning the Unitarian church. Jackson was a reverential hearer. He attended church a half-a-day. He paid close attention to the sermon, and made a profound bow to the pulpit as he retired. He joined the Presbyterian church after he left office. Van Buren trained in the Dutch Reform School, and attended the Episcopal church when he attended any. His Sunday afternoons were devoted to his political friends. Harrison cared very little for religious matters. Tyler was loose in regard to Sunday and worship. Polk, though not a professed Christian, was a regular attendant at public worship, occupying the pew next to the one Jackson sat in. Colonel Benton occupied the Jackson pew and would not give it up. General Taylor seldom went to church. Fillmore, more than any other of the Presidents, was an open and decided Unitarian, giving his influence and support to that sect. Pierce was always found at church on Sunday mornings. He attended the Presbyterian church. Buchanan was an Old School Presbyterian. The building was small, and the congregation was both small and poor. He was not a very reverential worshipper. He seemed wrapped in his own thoughts, paying no attention apparently to the service, and hurried away as if afraid to be addressed. Lincoln attended service once a day, and always seemed in agony while there. His legs were long, and the pews narrow, and he often relieved himself by putting his feet outside of the door, stretching them clear across the aisle. His pastor, Dr. Gurley, had the "gift of continuance," and the President writhed and squirmed, and gave unmistakable evidence of the torture he endured. General Grant was a trustee in the Methodist church; but that office did not imply a professional personal consecration. Hayes was a member of the Foundry Methodist Episcopal church, corner Fourteenth and Eighth streets. Garfield attended the Christian church on Vermont avenue. Arthur attended the St. John Episcopal church, one of the most aristocratic societies in the city of Washington. Cleveland attended the Four-and-a-Half Street Presbyterian church. Harrison is a Presbyterian and attends the Church of the Covenant, situated at the corner of Connecticut avenue and N street.

SALE OF AUTOGRAPHS.

At a sale of autographs the following prices were paid: For David Garrick's love-letter to Madame Rickobone, £7 10s., and for one of Defoe's, mentioning his ill-treatment by the press, £12 11s. A singularly interesting page of correspondence in the hand of Erasmus fetched £16 10s., and a humorous note from Burns to Mrs. Dunlop, £13, while a song in the same hand brought £12. A four-page musical manuscript of Bach was sold for £16, and a letter of Beethoven for £11 10s. A higher price—£22 10s.—was realized for one of Goethe's letters, written in his youth, when illness had obliged him to leave the university, and he was doubtful about

being able to resume his studies. Hogarth's letter accepting the membership of the Augsburg Academy realized $18 10s.; Mozart's to the Baronne de Waldstettin, £16 10s.; one of Rubens, £15 15s.; and a Tasso, £18 10s. The letter from Goldsmith to Sir Joshua Reynolds, describing his miseries on the Continent, £37 10s. Addison, £24; Duke of Buckingham, £10 10s.; Lord Byron, £11.; Robert Burns, £60; Catherine of Aragon, £43; Charles II. of England, £6; Lord Chesterfield, £5; W. Cowper, the poet, £6 12s. 6d.; Cromwell, £8 8s.; Queen Elizabeth, £82; James II. of Scotland, £22; James Stuart, £15 10s.; Mary Tudor, £81; Mary Stuart, £65; another, £57; John Moore, £8 15s.; Lord Nelson, £13; Thomas Payne, £5 7s. 6d.; Sir W. Raleigh, £33; Sterne, £20; Charles Stuart, £70; Wellington, £11 10s.; John Wesley, £5 5s.; Cardinal Wolsey, £12 10s.; Sir C. Wren, £10 5s.

CURIOSITIES OF THE BIBLE.

These curious facts about the Bible were ascertained, it is said, by a convict sentenced to a long term of solitary confinement: The Bible contains 3,586,480 letters, 773,692 words, 31,173 verses, 1,189 chapters, and 66 books. The word *and* occurs 46,277 times. The word *Lord* occurs 1,855 times. The word *Reverend* occurs but once, which is in the 9th verse of the 111th Psalm. The middle verse is the 8th verse of the 118th Psalm. The 21st verse of the 7th chapter of Ezra contains all the letters in the alphabet, except the letter J. The finest chapter to read is the 26th chapter of the Acts of the Apostles. The 19th chapter of II Kings and the 37th chapter of Isaiah are alike. The longest verse is the 9th verse of the 8th chapter of Esther. The shortest verse is the 35th verse of the 11th chapter of St. John. The 8th, 15th, 21st and 31st verses of the 107th Psalm are alike. Each verse of the 136th Psalm end alike. There are no words or names of more than six syllables.

HAIL.

The New York *Almanac* remarks that hail is chiefly restricted to temperate latitudes, and in these is most frequent during Spring and Summer. Within the tropics it seldom falls at a lower altitude than from 1,500 to 2,000 feet above the level of the sea. The explanation usually given of this fact is, that the temperature, which increases downward to the surface of the earth, is constantly so high in those regions that hail never descends to a lower altitude than that above-mentioned without being melted.

The squall of wind, or whirlwind, which accompanies and ushers in the hail storm, is no doubt produced by the depression of temperature which the hail communicates to the lower atmosphere in its descent to the ground.

Hail presents every appearance of having frozen during its fall, and not like snow of freezing in the form of clouds. It has much puzzled meteorologists to show why rain should ever get frozen in descending to a lower altitude, instead of melting and coming in the shape of rain. A cold current of air blowing suddenly in the direction of a rain cloud, is understood to be the immediate cause of most hail showers. The large size of hail stones is attributed to an accumulation during the progress of their descent. It is probable that the

largest commences with a small nucleus, which receives continued accessions from vapory particles in the neighborhood. Accordingly, hailstones are found to be smaller on the tops of mountains than in the neighboring plains and valleys, because, not falling so far, they do not augment their size by the addition of successive layers of watery vapor.

PASTE THAT WILL KEEP A YEAR.

Dissolve a teaspoonful of alum in a quart of warm water. When cold, stir in as much flour as will give it the consistency of thick cream, being particular to beat up all the lumps; stir in as much powdered rosin as will lay on a dime, and throw in half a dozen cloves to give it a pleasant odor. Have on the fire a teacup of boiling water, pour the flour mixture into it, stirring well all the time. In a few minutes it will be the consistency of mush. Pour it into an earthen or china vessel; let it cool; lay a cover on, and put it in a cool place. When needed for use, take out a portion and soften it with boiling water. Paste thus made will last twelve months. It is better than gum, as it does not gloss the paper, and can be written on.

MONEY.

The first mint in the United States was put in operation in 1793, and from that time until 1857, the whole amount of gold coined was valued at $481,422,078.70; value of silver coinage, $107,527,917.53; value of copper coins, $1,662,823.55; making the valuation of the whole coinage $589,612,819.78. The whole number of pieces coined in this time was 623,640,499.

ASSAFŒTIDA.

This plant is found in the greatest abundance in the Persian provinces of Khorhassan and Laar, and thence extends, on the one hand, into the plains of Toorkistan, upon the Oxus, where it seems to have been met with by Sir Alexander Burns, and on the other, stretches across from Beloochistan, through Caudahar, and other provinces of Affghanistan, to the eastern side of the valley of the Indus, in Astore. Dr. Falconer did not meet with it in Cashmere. It is collected in its wild state and sent to Cabul and India, yielding a good profit to those who pick it, as it is used very generally throughout the East.

Although these fœtid gums are now branded with all sorts of vile names for their offensive odor, yet they were in high repute among the ancients, assafœtida being reckoned one of the most agreeable seasonings for food, and highly esteemed for its medicinal uses, so that it was worth its weight in silver.

A stalk of the plant was sent to the Emperor Nero, and yearly to Apollo, of Delphos, as more precious than the other productions of the earth, inasmuch that "he is worthy of silphium," passed into a proverb — silphium being one of the names by which it was formerly known. Even in the present day, the Persians and other Asiatics flavor their food with assafœtida, and term it the food of the gods. Tastes, we know, differ, for by some garlic is highly esteemed, while others detest its flavor. Assafœtida ranks high in the *Materia Medica* of the Chinese physicians. It forms an important article of trade in the East. The vessels that carry it to the Chinese ports from Bombay, are so

imbued with the odor that they spoil most other goods.

The Norwegians use it, with their native brandy, as a cure for numerous ills; and many persons in our own country carry it about their persons, to smell of it frequently, as a preventive of epileptic fits.

ALABASTER AND PLASTER PARIS.

Alabaster is a compact of gypsum, and occurs massive, with a compact fracture; it is translucent; has a glimmering luster, and its colors are white, reddish, or yellowish.

The purest kinds of this material are used in Italy for vases, cups, candlesticks, and other ornaments. It is found at Castelno, in Tuscany, thirty-five miles from Leghorn, at two hundred feet below the surface of the earth.

The yellow variety, called by the Italians *alabastro agatato,* is found at Sienna; another variety of a bluish color, obtained at Guercieto, is remarkably beautiful, being marked with variegated shades of purple, blue and red. These alabasters are carbonates of lime.

The principal manufactory of alabaster ornaments is at Valterra, thirty-six miles from Leghorn, where about five thousand persons live by this kind of labor. In making, they require great care, and must be preserved from dust, as the alabaster is difficult to clean. Talcum, commonly called French chalk, will remove dirt, but the best mode of restoring the color, is to bleach the alabaster on a grass plat. Gum water is the only cement for uniting broken parts.

Plaster of Paris is likewise a compact gypsum, but contains a small portion of carbonic acid, which makes it effervesce when treated with acids. It was formerly exported only from Montmartre, near Paris, hence its name; it is much used in ornamenting rooms in stucco, in taking impressions of medals, in casting statues, busts, vases, time-piece stands, candelabras, obelisks, and for many other purposes.

The common plaster of Paris is ground after being calcined; and in this condition it has the property of forming a pliable mass with water, which soon hardens and assumes the consistency of stone.

Oriental alabaster is not a sulphate but a true carbonate of lime, and on account of its peculiar tint and transparency, and as it appears that it was formed similar to stalagmite, it was called by the ancients alabaster.

A SIMPLE MICROSCOPE.

When a sound eye of the average power, neither long-sighted nor short-sighted, examines any object in order to see it most distinctly, the observer places the object at the distance of about *six* inches, and in this position it is seen of its natural size, and is not said to be magnified. If we hold up at this distance a finger three-fourths of an inch broad, it will appear to cover upon a wall ten feet distant a space of fifteen inches. If we hold it up at three inches from the eye, it will cover a space of thirty inches, and will appear *twice* as large, and if we hold it up at the distance of an inch and a half, it will cover a space of sixty inches, and will appear four times as large. But though magnified in these two last positions, it is not seen distinctly, and therefore we see it more imperfectly than at the distance of *six* inches.

If we look at the finger, when seen indistinctly at the distance of three, and one and a half inches from the eye, through a small pin-hole in a piece of card, it will appear not only magnified, but tolerably distinct, and the distinctness will increase with the smallness of the aperture. The most satisfactory aperture is one made with a needle in a piece of sheet-lead or tin-foil, and when the eye is applied to it, the vision will be such that discoveries, invisible to the eye, may be made by the observer.

A single sphere of glass, from the twentieth to the fiftieth of an inch in diameter, forms a good microscope, with which many interesting phenomena may be observed, and even important discoveries made. Dr. Hooke seems to have been the first person who made microscopes of this kind. Having taken a clear piece of glass, he drew it out by the heat of a lamp, into fine threads, and then holding the ends of these threads in the flame, he melted them till they run into a small round globule, which hung to the end of the thread. The globule is then stuck on the end of a piece of wood with the thread cut as short as possible, standing uppermost, and the ends are ground off, first on a whetstone, and then polished on a metal plate with tripoli. When the glass sphere is thus finished, it is placed against a small hole made in a thin piece of metal, and fixed with wax. Thus fitted up it will both magnify and make some objects look more distinct than many of the great microscopes.

When a microscope cannot be obtained for some special purpose, a tolerably good *extempore* one may be made by filling with water, or any other limpid fluid, two small bottles, or test tubes, crossing at right angles, and looking at the object to be examined through the crossed parts.

THE TOOLS OF GREAT MEN.

It is not tools that make the workman, but the trained skill and perseverance of the man himself. Indeed, it is proverbial that the bad workman never yet had a good tool. Some one asked Opie by what wonderful process he mixed his colors. "I mix them with my brains, sir," was the reply. It is the same with every workman who would excel. Ferguson made marvelous things, such as his wooden clock, that accurately measured the hour—by means of a common pen knife—a tool in everybody's hands, but then everybody is not a Ferguson. A pan of water and two thermometers were the tools by which Dr. Black discovered latent heat, and a prism, a lens, and a sheet of pasteboard, enabled Newton to unfold the composition of light and the origin of color. An eminent foreign savant once called upon Dr. Wallaston and requested to be shown over his laboratories in which science had been enriched by so many important discoveries, when the doctor took him into a little study, and pointing to an old tea tray on the table containing a few watch-glasses, test papers, a small balance and a blowpipe, said, "There is all the laboratory I have!" Stothard learned the art of combining colors by closely studying butterflies' wings. He would often say that no one knew what he owed to these tiny insects. A burned stick and a barn door served Wilkie in lieu of a pencil and canvas. Bewick first practiced drawing on the cottage walls of his native village,

which he covered with his sketches in chalk; and Benjamin West made his first brushes out of the cat's tail. Ferguson laid down in the fields at night in a blanket, and made a map of the heavenly bodies by means of a thread with small beads on it, stretched between his eye and the stars. Franklin first robbed the thunder-cloud of its lightning by means of a kite made with two cross sticks and a handkerchief. Watt made his first model of the condensing steam engine out of an old anatomist's syringe, used to inject the arteries previous to dissection. Clifford worked his first problem in mathematics when a cobler's apprentice, upon scraps of leather, which he beat smooth for the purpose; while Rittenhouse, the great astronomer, first calculated eclipses on his plow.

GRINDSTONES.

Where They Come From and how They are Made.

The sandstone formation overlaying the coal beds of England furnishes the grindstones of that country, the principal quarries being located at Newcastle-upon-Tyne, and at Wickersly, near Sheffield.

These quarries are worked by hand, and all the grindstones are made with mallet and chisel, and have been imported into this country for over 100 years.

The grindstones from the provinces of Nova Scotia and New Brunswick are also the overlaying sandstone formations of the coal districts bordering on the Bay of Fundy, and extending across the provinces to the Gulf of St. Lawrence. These immense deposits contain a great variety of grits, known as the Nova Scotia grindstones. These quarries are generally worked by the French people, known as "Acadians," from the name they gave their country, "Acadia," who are the descendants of the Huguenots, who were driven out of France by religious persecution.

They are a very industrious and simple-minded people, and the females retain to this day the style of dress brought over from France by their ancestors.

The tides of the Bay of Fundy rise and fall from 60 to 70 feet every 12 hours, and these people avail themselves of this power to work the quarries, which extend from a high bluff on the mainland, down to low water mark in the bay.

At low water a huge mass of stone is loosened from its bed, and a heavy chain is passed under it and around a large boat which is placed alongside. As the tide rises, the stone attached to the bottom of the boat is floated into a sand cove at high water, and made into grindstones after the tide recedes. This work is done with mallet and chisel, the rough parts being first chopped off with a heavy axe. Machinery has been recently introduced, and the small grindstones are now turned in a lathe by steam power.

The sandstone deposits of this country which are made into grindstones are found along the shores of Lake Erie, and extending for a considerable distance east and west of Cleveland, and inland as far as Marietta, on the Ohio. They are also found on the shores of Lake Huron, above Detroit.

The blocks of stone are roughly hewn out, with a square hole in the center. This is placed on a heavy square iron shaft furnished with a 9-inch collar, against which the stone

is securely fastened by means of another collar keyed against the side of the stone. The shaft and stone being driven by steam power, two men on opposite sides turn it off perfectly true, by means of soft iron bars about six feet long and two by one-half inch thick, which are drawn out to a thin point, which is curved upward.

CHARLES GOODYEAR.

The name of this great inventor has been familiar to the public for many years; yet few out of the circle of his immediate friends have known the story of a life so full of the strangest vicissitudes, ennobled by such a self-sacrificing and never-tiring devotion to one object, but saddened by so many sorrows that it sounds like a romance as well as a reality. He lived, indeed, to see his bright dreams realized; he lived to see the almost worthless gum, with which the savages of Central Africa smeared their bodies, as a protection from insects, become a staple of commerce, employing for its transport ships in every sea, giving employment to thousands of workmen and millions of capital, and entering into the arts, the sciences, the daily uses, and the mechanical industries of the highest civilized life. The man who accomplished all this, has not lived without purpose or in vain. yet it is impossible to give any complete idea of the price which was paid for these great results — the long toil, the suffering so cheerfully endured, the privations which none but a son of genius, living on his dreams, could have borne, the failures, the disappointments, the mortification and the success which came at last, so late that it was no longer worth wishing for.

The most striking point in Mr. Goodyear's character was his sunny and cheerful disposition. He lived a life of constant struggle, he was involved in long and painful lawsuits with those who pirated his inventions, he was necessarily brought in collision with many who were connected with him, or opposed to him in business; many lost money by the connection; but such was the impression made by this simple-minded and enthusiastic dreamer that, at the hour of his death, he had no enemy living. His generosity, his animated and affectionate nature, his earnestness and enthusiasm made him friends everywhere, and he was fortunate, far beyond the usual lot of men, in exciting neither hatred, or envy, or malice.

We presume that the story of this eventful life will be made public in some more formal mode by the friends of his family, and we will not attempt to fully trace the progress of his inventions. It was in 1834 that Mr. Goodyear turned his attention to the manufacture of India rubber. There was a mystery about this tropical gum which gave it a strange charm in his imagination. It was not an article of commerce, but appeared, from time to time, only as a rare curiosity, brought from foreign lands. The savages who possessed it kept the mode of its manufacture a profound secret. It was found only under the burning sun of the equator, in the gloomy swamps of the unexplored Amazon, or the jungles of Asia and Africa. Its nature was as mysterious as its origin, the chemists who examined it were baffled in their attempts to make it of practical use. Ingenious men, abroad and at home, had attempted to solve the mystery, but all had failed. That it was of immense value in the arts, to supply a thousand wants of civilized life, was

obvious to all, but the elastic gum kept its own mysterious secret, and there was no clue to the discovery.

To discover the secret and solve the problem became the dream of Charles Goodyear's life. The difficulties and failures which he encountered only made it more dear to him. He asked aid from men of science, but they discouraged him; his associates abandoned the pursuit in despair; his friends one after another left him, but he only clung the closer to his cherished faith. In one of the contests by which pirates of his invention sought to rob him of his rights, the veil was half withdrawn from the life of the inventor, and a few details of the privations which he endured were given. He was in such extreme penury that his bed was sold from under him; he was so poor that it was said he could not buy an ounce of tea on credit. In the dead of Winter there was no food in his house, and no fuel for fire. This was not the struggle of a few months only, but it was the story of years, for it was not till 1844, after ten years of toil, that he perfected and patented his discovery. His labor, however, did not cease, and even to the hour of his death he was devoted to his favorite pursuit, upon which he lavished the immense sums which he received from his patents. His life was subject to the strangest vicissitudes. He went from a poor debtors' prison to a palace in Paris. The man who was an object of contempt in an obscure village, on account of his poverty, received the Grand Cross of the Legend of Honor from the Emperor Napoleon, as a reward of his genius. In Europe, as well as America, his name was honored and his merits appreciated.

ENGRAVING.

Engraving was practiced at a very early age by the Egyptians, who used wooden stamps, marked with hieroglyphics, for the purpose of marking their bricks. It was first mentioned B. C. 1491, by Moses (Exodus xxviii, 9), who was commanded to take two onyx stones and *grave* on them the names of the children of Israel. Its revival in Europe dates from the fifteenth century. Mezzotint engraving was invented by Col. von Siegen about 1643; engraving in colors by J. C. Le Blond, about 1725; in imitation of pencil by Gilles des Marteaux, in 1756; and aquatint engraving by Le Prince, about 1762. Engraving on copper, or chalcography, is said to have been practiced in Germany about 1450. Some early plates by Albert Durer, dated 1515, 1516, are believed to be impressions from steel plates. This metal, however, was very seldom employed by engravers, only one specimen, executed by Mr. J. I. Smith, in 1805, being known until 1818, when Mr. C. Warren exhibited an impression from a soft steel plate to the Society of Arts. Engraving on wood is said to have been practiced by the Chinese as early as B. C. 1120. The precise date of its introduction into Europe is unknown. Some authorities state that a series of woodcuts, illustrative of the career of Alexander the Great, was engraved by the two Cunio, in 1285. This story is, however, rather doubtful; and perhaps the origin of the art may be traced to the wooden blocks used by notaries for stamping monograms, in the thirteenth century, and to the engraved playing-cards which appeared in France about 1340. The earliest wood-cut in existence represents St.

Christopher with the infant Savior, and is dated 1423. Many block books exist of about the year 1430; but the art was not brought to great perfection till the commencement of the sixteenth century. Albert Durer (1471—1528); Lucas, of Leyden (1494—1533); Holbein, whose Dance of Death appeared at Lyons in 1538; Gerard Audran (1640—1703); Woollet (1735—1785); Thomas Bewick (1753—1828); Nesbit, born in 1775; and Harvey, born in 1796, rank foremost among the old school of engravers; but the modern school, stimulated and encouraged by the growing taste of the public for finely illustrated books and periodicals, may be said to have completely surpassed all their predecessors.

THE FIRST AMERICAN ENGRAVER.

Mr. Nathaniel Hurd was undoubtedly the first American engraver. Mr. Hurd was born in Boston, Mass. In Buckingham's *New England Magazine* appeared a series of articles on "Early American artists and Mechanics," the first number of which (Vol. 3, July, 1832,) was devoted to an account of Mr. Hurd, accompanied with a portrait. This writer says: "Among our seal cutters and die engravers, and engravers on copper, was Nathaniel Hurd. His grandfather came from England, and settled in Charlestown. He died in that town in 1749, aged 70. His son Jacob married the only daughter of John Mason, of Kingston, in the Island of Jamaica, and died in the year 1758. He was the father of Nathaniel Hurd, who is the prominent subject of this memoir."

Hurd was a real genius. To a superior mode of execution he added a Hogarthian talent of character and humor. Among other things of his, he engraved a descriptive representation of a certain swindler and forger of bills, named Hudson, a foreigner, standing in the pillory. In the crowd of spectators, he introduced the likenesses of some well-known characters, which excited much good-natured mirth. The following is an entertaining account of this print:

"In the year 1672 there appeared in Boston a curious character, who called himself Doctor Hudson. He gave out that he was a Dutchman; that he was possessed of a large fortune, and that he was traveling for his amusement. He was dressed very gaily, tried to push himself into genteel company, and, though rather expensive in his appearance, he showed but little money and displayed no resources. He was well watched. After some time, a fellow was detected in putting off a note purporting to be from the Treasurer of the Province, which proved a counterfeit. His name was Howe; he confessed he was a partner in villiany with Dr. Hudson, and that they had been privately engaged in making up a number of the Province notes, which were in high credit in this and the neighboring provinces, and sold readily at an advanced price. The doctor was also taken into custody. They were tried and convicted; Hudson was ordered to the pillory, and Howe to the whipping post. The execution of their sentence was accompanied by the collection of an immense crowd, and immoderate exultation.

"Hurd immediately put out a caricature print of the exhibition, which excited much attention. Hudson was represented in the pillory, and at a short distance was Howe, stripping

near the whipping post. The devil is represented flying towards the doctor, exclaiming, 'This is the man for me.' In front of the print is the representation of a medallion, on which is a profile of Hudson, dressed in a bag-wig, with a sword under his arm (as he generally appeared before his detection), partly drawn from the scabbard, with the words 'Dutch Tuck' on the exposed part of the blade. Round the edge is 'The true profile of the notorious Doctor Seth Hudson, 1762.'

"In an obituary notice of Mr. Amos Doolittle, of New Haven, Conn., published in *Silliman's Journal of Science and Arts*, April, 1832, it is claimed that he was 'the first person who engraved on copper in this country.' This notice states that his first attempt was a print of the battle of Lexington, after a drawing by Earl, in 1775, which was only two years prior to the death of Mr. Hurd, as will be seen by the above date, eleven years subsequent to the likeness of Dr. Sewall. Paul Revere also engraved on copper some time before the earliest date claimed for Mr. Doolittle. There is a copy of a print engraved by Paul Revere, in the Redwood Library, Newport, R. I., representing the massacre of citizens in Boston, on the 5th of March, 1770, which was issued the same year.

"In the art of line engraving, Mr. Hurd was his own instructor, and had he lived to a more advanced age, would doubtless have distinguished himself yet more in an art, in the exercise of which it is evident he took great delight, and for which, it is equally manifest, he possessed both taste and talent. He died 17th December, 1777, and was buried in the old 'Granary Burial Ground,' in Boston."

THE WASTING OF COINS.

It is stated by an eminent English authority that the life of coins is much briefer now than before the introduction of steam for passenger travel. This is attributed to the almost constant attrition to which they are subjected by being carried about, and the constant passage of them from hand to hand. The authority we quote states that it takes on an average a hundred old shillings to make eighty new ones. This is a fearful waste, and as we expect some time to see gold and silver again a common medium of exchange in this country, it is of some importance to ascertain a remedy for the deterioration of coins. With copper and bronze coins, it may be of no consequence, as they never bear intrinsically the value which they nominally possess, so that there is really no actual loss from wear. Gold and silver coins, however, are really worth their face or nominal value.

LOOKING-GLASSES SPOILED BY SUNSHINE.

The *Industrial Monthly* says it does not seem to be generally understood that the amalgam of tin foil with mercury which is spread on glass plates to make looking-glasses, is very readily crystalized by actinic solar rays. A mirror hung where the sun can shine on it is usually spoiled; it takes a granulated appearance familiar to house-keepers, though they may not be acquainted with the cause of the change. In such a state the article is nearly worthless, the continuity of the surface is destroyed, and it will not reflect outlines with any approach to precision.

WHITE LEAD.

The manufacture of White Lead was the discovery of the Dutch a long time ago, and though many attempts have been made to shorten and improve the process, owing to certain natural limitations, it has never been essentially changed where the production of the best article was required. This process probably varies somewhat in detail in different establishments, but yet it remains substantially the same as at first introduced. It requires the purest metalic lead, which is either cut or cast into such forms as to present the largest surface to the action of the acid. Formerly it was cut into spiral coils, perhaps a quarter of an inch thick, and of such size as to fit into the top of small earthen vessels like a flower pot. Lately it is more generally cast into very thin grates or buckles, five or six of which are laid within the pot upon a small projection made to receive them. In the bottom of the pot, but so as not to touch the lead, is a small quantity of acetic acid or vinegar. Pots thus prepared are placed in rows upon a convenient area, perhaps twenty or twenty-five feet square; a bed of spent tan bark a foot thick, it may be, being spread beneath them. When the area has been covered by rows of pots, thin sheets or strips of lead are laid upon the top; a small piece, however, being either broken out of the edge of each pot, or left out in making it, so as to give a free circulation of air or gas from one to another of the whole number. Over these rows, as thus arranged, is now placed a covering of planks, on which is spread another bed of tan, and upon it arranged another series of pots just like the former. And so, layer after layer, is built up a "stack" some twenty-five feet high, the sides of which are held in place by a frame and planking. The stack has not been long completed before the tan begins to "heat," and the fermentation raises the temperature within, to 140 degrees or more, and so turns the acetic acid within the pots into vapor. This rises and attacks the strips of lead which have already began to oxidize; and thus is formed the thin film of another compound called the *subacetate of lead.* But the fermentation of the tan has by this time begun to give out freely *carbonic acid*, which, reaching the subacetate, draws to itself the fine particles of lead which it contains, and so leaves the acid free to attack the metalic lead beneath, as it did before. This simple chemical process goes on for three months or more, till the power of the tan is exhausted, so that it can no longer keep up the fermentation when the stack is taken down, and a most wonderful change is found to have taken place within the pots. The strips of lead retain their form indeed, somewhat increased in size, but they are changed in color to a most beautiful white. The surface crumbles freely, and the fragments are rubbed without difficulty, to the finest powder. This transformation in some cases has gone all through the original metal; but in others a core is left of blue metal which has not been changed. The difference found to exist will depend on various circumstances, such as moisture of the atmosphere, temperature, position in the stack, strength of the tan, &c. If these cores exist, however, the next process is to separate them, and reduce the "white lead" to fine powder. This is accomplished in some establishments by passing the pieces of carbonate, as taken from the pots, between rollers; in others, by breaking them by other means and, in any case, screening away

the "blue lead;" after which the "white lead" is ground in water between mill stones, the process being repeated till the paste is as fine as it is possible to be made. The remainder of the process consists in evaporating the water; which is done in many establishments in large copper pans having two bottoms, between which the exhaust steam from the engine is passed. Others have different arrangements; but, however accomplished, when the drying is complete, the powder is ready to be packed for the market.

The grinding of paints in oil is a distinct process, and is carried on mainly by a different class of manufacturers.

THE MOON'S INFLUENCE ON MAN AND PLANTS.

The influence of the moon is admitted by all medical men practicing in India. From infancy the natives of tropical climates are taught to believe in lunar influence, and that with good cause, for the intimate connection which exists between the new and full moon, the disturbed state of the atmosphere, and the attacks of epidemic has been well ascertained. Two hundred years ago, a physician named Diemerbroeck wrote a treatise on the Plague, in which he says: "Two or three days before and after the full moon the disease was more violent; more persons were seized at these times than at others." Many other authorities could be quoted to prove that the moon's influence is not to be regarded as purely imaginary, as is commonly the case. Many curious facts are recorded concerning the moon's influence upon the vegetable kingdom. It is stated that if peas are sown when the moon is increasing, they never cease to bloom; that if fruits and herbs are set during the wane of the moon, they are not so rich in flavor nor so strong and healthy as when planted during the increase. In Brazil, the farmers plant during the decline of the moon all those vegetables whose roots are used as food; and, on the contrary, they plant during the increase of the moon the sugar-cane, maize, rice, etc. The English gardeners observe similar rules in regard to grafting, pruning, etc. From observations of Mr. Howard it appears that northerly winds are most frequent during a full moon, and south-west winds blow chiefly at the time of the new moon. It is also remarkable that rain falls most frequently during the last quarter of the moon, and that not a twentieth part of the rains of the whole year falls at full moon.—

RICH MEN OF OLD.

The rich men of olden times eclipsed the rich men of this age as the rich men of to-day the simpler fortunes of their ancestors in America. Men talk of ten, twenty, forty, fifty and sixty millions in the United States, as if the like had never been before. But what are the big facts and figures as we read them? Why, to give them in a heap of riches, that Ptolemus Philadelphus, in Egypt, had a fortune of $350,000,000; that Cleopatra drank a glass of wine in which was dissolved a pearl worth $40,000; that Cicero paid $5,000,000 for a country seat; that Messella paid $2,000,000 for a homestead; that Seneca owed $12,000,000, and Tiberius $12,000,000; that Julius Cæsar owed $14,000,000 before he got an office; that Marcus Antonius ran in debt $1,500,000 for his election, and, what

is more odd, paid it off, and afterwards cleared $720,000,000. Æsop, the poet-slave, paid $400,000 for one single party, and Caligula paid as much for a supper, and drank old wines worth $20 an ounce, and roasted pigs over fires made of nuts and raisins. The bedsteads of Heliogabalus were of pure silver and gold, and $80,000 were necessary to keep up the dignity of a Roman Senator. The capacity of a Roman theatre was fabulous, while the wooden theatre of Sharurus had 80,000 seats, the Coliseum 87,000, with 22,000 standing places, and the Circus Maximus room for 386,000 spectators. Even in the fifth century, after Rome was plundered by Germans and Vandals, Zacharius reports from Rome 384 streets, 80 golden statues, 56,557 palaces, 13,051 fountains, 2,785 bronze statues of Emperors and officers, 21 colossal horse statues, 41 theatres, 2,300 perfumery stores, and 2,291 prisons. Then, for taxes, the Thebans paid for income duty, in one year, $6,000,000, while Alexander had a library of 700,000 volumes, at a time even when manuscripts were costly, and Athens had the theatre of Bacchus, holding 30,000 people.

In the face of such figures, even London and Paris, and much more, New York, will readily cease boasting of their rich men, big places, and vast proportions. But the moral is, what vanity and what folly! Even our biggest public robbers will have to stand back in the face of such a plunderer as Marcus Antonius. There were Roman Senators who spent $80,000 a year. Modern wealth, compared with the ancient article, is like a drop to the ocean, or as a single pebble or shell on the sea-shore.

DEATHS BY WAR.

All speak of the horrors of wa , yet very few can comprehend its dire ravages in the human family. M. Camille Hammarion, a French savan, has undertaken the task of arriving at an approximate estimate of the destruction of life since the siege of Troy — that is, during the last 3,000 years — and comes to the conclusion that in this long period mankind has not enjoyed a single year of peace. Referring to the last hundred years — from 1771 to 1871 — this writer gives the following alarming figures:

During the period of the war of American Independence, 1778 to 1783, there were destroyed 400,000 lives. The wars of the French Republic, from 1791 to 1800, cost France 1,800,000 lives, and other nations 2,500,000. The wars of Napoleon under the Empire cost France 2,600,000, and the other nations 3,500,000 lives. Since 1815, France has engaged in thirteen wars — in Spain in 1823, in Greece in 1827, in Algiers and Belgium and St. Juan d'Ulla in 1830, and in Rome in 1849; and then come the wars in the Crimea, Italy, Syria, China, Cochin China and Mexico. These wars swallowed up more than 2,500,000 lives. Prussia has lost within the last hundred years 600,000; England 1,000,000; Russia, not including the losses sustained in the wars against France, 1,100,000; Turkey, Persia, and Greece, 1,500,000; Italy, 800,000; Austria, outside of the wars with the above-mentioned nations, 150,000; Spain, 450,000; the American Colonies, 500,000; Portugal, 110,000; the wars of the United States within the present century, 1,200,000. Grand total of the lives destroyed by the wars of civilized nations during the last hundred

years, 19,340,000. Including the wars of all nations, civilized and barbarous, the minimum loss per century is 40,000,000, or more than the present population of the United States.

ANCIENT GEMS.

From the earliest ages of which any records have been preserved, the love of gems and jewels of every kind has been prevalent. Among all nations, and in every class of society, this taste has been shared alike by the cultivated and the ignorant. In the East, wealth was estimated by the number of ornaments and precious stones a man possessed. Gems formed a prominent part in the decoration of the ancient Mosaic priesthood; and we find twelve precious stones glittered in the breast-plate of the Pontiff of the old law; and the Pope, when celebrating a high mass, always uses a formal, or fine silver plate richly gilt, embossed with a passage from the eighth chapter of Daniel, with clouds wreathing about the figures of attending cherubim, with circles of precious stones surrounding the whole, one larger and more beautiful than the others in the centre. Pius VI. had a splendid ornament of this description, of pure gold, with a rich olive branch of the same metal, of enameled green, with a knob set with the finest Orient pearls; but it disappeared after the arrest of the Pontiff, and its fate was never known.

Gems were also used by the writers and poets as similes and figures, in the Talmud. It is asserted that Noah had no other light than that furnished by diamonds. Some have suffered exile, torture, and death itself, rather than reveal the hiding-places of their cherished treasures. Nonius, a Roman Senator, who owned an opal valued at $85,000, preferred proscription rather than surrender the coveted trinket. They also afford an elegant floating investment; and many illustrious persons, who have been driven by political reasons to quit their native land, have been indebted to their jewels for subsistence. The Prince Palatine, after he had lost the battle of Prague, fled to Holland, with over a million on his person in rare and costly gems. Many of the refugees who sought an asylum in the United States from France and St. Domingo, brought with them considerable resources in this way.

TIME DEVOTED TO MEALS.

Dr. Derby states that the average time occupied in the process of taking food by the people of Massachusetts does not exceed from twelve to fifteen minutes for each meal. Such haste is injurious to health for many reasons. The process of digestion begins in the mouth with the action of the teeth, and through excitement of the salivary glands by the presence of food. Unless saliva is abundantly mingled with the latter, the first act of digestion is obstructed, and Nature's plan is changed. This fluid not only lubricates, but acts chemically in the mouth, if a reasonable time be given it, upon all the starchy elements which make up the great bulk of what we eat. Eating in haste, a great deal of air is swallowed. Air is to a certain extent always entangled in the saliva, and assists the digestion, but when "wads" of food succeed each other very rapidly, they seem to act like pistons in the tube leading from the back of the throat, and drive before and between them into the stomach such

amounts of air as to distend that organ and impede its functions. Another effect of eating in this way is that the masses of food, imperfectly mixed with saliva, become impacted in the esophagus, checking its muscular action, which is obviously intended to propel only one piece at a time. This embarrassment is overcome by taking at one gulp as much fluid as the mouth will hold, thus distending the elastic tube, and washing the obstructed food into the stomach. All this is unnatural, and can hardly fail to work mischief.

AGES OF EMINENT MEN.

When they Achieved Success in Life.

Admiral Blake fought his great naval battles at 55 and 57.

Muller had written many of his works before the age of 30.

Wheatstone at 35 had invented a kind of telegraph.

Dalton, between 34 and 37, made his discoveries in the atomic theory.

MacDonough was but 28 when he gained the victory of Lake Champlain.

Hogarth was famous at 32, and retained his fame to the last. He died at 62.

Alva was successful in the Netherlands at 19, and at 24 fought well in Portugal.

Mazari early entered diplomacy; at 41 was prime minister, and at 59 died.

Ziska organized his armies and gained his great victory about 40, and died at 45.

Codova at 17 was famous; at 41 was commander-in-chief of the army of Italy.

Wren laid the corner stone of St. Paul's at 43; when he died at 91 it was not completed.

Kaulback was 40 when he was appointed to the task of decorating the museum of Berlin.

At the earliest age possible, 24, Sir Edwin Landseer was elected member of the Academy.

Grove at 31 set forth his views on the correlation of forces, and at 41 was Queen's counsel.

Thorwaldsen became famous at 33 by his statue of Jason, and at 50 produced "Christ and His Apostles."

Frederick William, of Prussia, began his reign at 25, and ruled twenty-seven years, until he was 52.

Warren Hastings was a precocious youth; at 44 was Governor-General of India, and at 54 retired.

Radetzky at the advanced age of 83 conducted the campaign in Italy; at 90 retired from the service.

Napier began his reform in India at the age of 59; gained a great victory at 61, and at 62 returned to England.

Von Moltke at between 66 and 70 directed the operations of the great wars of Prussia against Austria and France.

Titian, who flourished later than most artists, began to be original at 35, and at 82 executed two of his greatest paintings.

Gengis Kahn became ruler at 13; at once raised an army of 30,000 men, was victorious, and at 40 he was Emperor and mogul.

Crawford was famous at 25; executed sixty important works and fifty sketches, and was doing his greatest work at 43, when he died.

Adams, the English astronomer, discovered Neptune at 27; and Leverrier, who made the discovery at the same time, was also young.

Nelson at 39 was distinguished at the battle of St. Vincent, and was knighted and made Rear Admiral. By

the age of 40 he had been actually and personally engaged with the enemy one hundred and twenty times, and had gained the "Battle of the Nile;" and was 47 at Trafalgar, where he was killed in action.

Rumford, at 32, was a very successful administrator in Bavaria; at 45 he published the experiments on which he had been engaged — on heat, etc.

Helmholtz at 23 presented his views on the correlation of forces; at 30 invented the opthalmoscope, and at 38 was professor at Konigsberg.

Madison between 30 and 35 wrote his papers in the *Federalist*. At 49 presented his ablest State paper. In his old age he opposed the war of 1812.

Hannibal was high in command at 18; a very distinguished General at 26; and at 31 fought the great battle of Cannæ, and the second Punic war at 46.

Charlemagne was King at 26; conquered Agincourt at 28; was master of France and most of Germany at 29; was master of Italy at 32, and of Spain at 36.

Tyndall at 32 was a Fellow of the Royal Society; at 33 was professor in the Royal Institution; at 43 published his "Heat as a Means of Motion."

Darwin published his "Origin of Species," which represented the labor of twenty years, at 50; it may therefore be said to have been composed between 30 and 50.

Mayer at 27 published his first paper on "Forces of Inorganic Nature," at 31 another paper, and at 34 and 62 still other papers bearing on the same theme.

Julius Cæsar at 21 distinguished himself on the sea, and soon after held the office of tribune, quæstor and edile. Before 40 he had completed the war in Spain, and was consul. Before 45 he had twice crossed the Rhine, had conquered Gaul; had twice passed to Britain; at 52 he had won Pharsalia and had supreme power; he died at 56, *"the victor of five hundred battles, and the conqueror of a thousand cities."*

Gall as a boy began his study of phrenology. After twenty years' study he, at 33, published a work, and at 38 began his career as a lecturer. At 42 Spurzheim became a convert.

Fouche at 29 was conspicuous in the French Convention of 1789. At 32 was driven from the Convention; from 37 to 47 he was the Napoleon of Jesuitical diplomacy.

Selden at 23 became an author and in repute; at 28 and 35 published several important works, and at 56 entered Parliament, where his influence was on the side of moderation.

Benjamin West, extraordinarily precocious, was a great painter at 30, and was a young man when he produced "The Death of Wolfe," that wrought a revolution in painting.

Esquirol at 22 founded the lunatic asylum that became the model for all France, and at 45 made a great reputation by a course of lectures on the subject of the treatment of the insane.

Gustavus Adolphus, one of the greatest as well as one of the best men who ever wore a crown, succeeded to the throne of Sweden at 12; became famous in war before 20, and fell in battle at 38.

Monroe in the war of the Revolution distinguished himself when between 20 and 25; at 25 was a member of Congress. At 58 was chosen President. At 35 was Minister to France, and retired at 66.

Huxley at 29 was professor in the Royal School of Mines; at 30 had

published "Man's Place in Nature," and had distinguished himself in the scientific world by his successful controversy with Prof. Owen. He was 44 when he published his remarkable essay, entitled, "The Physical Basis of Life."

John Jay rose very rapidly in his profession; at 23 was a very prominent lawyer in New York; at 30 was a conspicuous member of the Continental Congress, and wrote the address to the people of Great Britain. At 32 he drafted the Constitution of New York, and was appointed Chief Justice of the State. At 33 he was president of the Continental Congress. At 37 he, with Adams and Laurens, signed the treaty of peace. At 44 he was appointed Chief Justice. At 56 he retired from public life, having done more and better in a great national crisis than almost any other man of public history. The last 30 years of his life were comparatively inactive.

SIMPLE TIMBER PRESERVATIVE.

To render posts of timber, placed in the ground, practically impervious to moisture and for a long time prevent decay, the following simple recipe has been tried, and found to answer the purpose excellently. For fence or gate posts, it is particularly recommended. Take linseed oil, boil it and mix it with charcoal dust until the mixture has the consistency of an ordinary paint. Give the posts a single coat of the mixture, or paint, before planting them, and no farmer, says one who has used it, living to the age of the patriarchs of old, will live long enough to see the posts rotten. The posts should be well seasoned and dry when the paint is applied.

AWNINGS.

Awnings of *linen* were first used by the Romans in the theater at the dedication of the Temple of Jupiter, B. C. 69. It is also claimed that cotton awnings were used before that time. They were made of different colors. Over the amphitheater of the Emperor Nero, the awnings were extended by the aid of ropes and dyed azure, like the heavens, and bespangled with stars. In the Roman houses the halls for audiences had an opening in the middle which was covered in summer with a red awning.

UP SALT RIVER.

The origin of this expression, as applied to a defeated political party, was as follows: Davy Crockett, the famous Kentucky Congressman, while a Whig candidate, was challenged by his Democratic opponent to meet him on the stump in joint discussion. Crockett accepted and the day and place were fixed, but Crockett did not appear, and the people thinking him afraid to do so, rallied for his opponent and elected him. It afterwards turned out that Crockett, who had started for the place in a canoe propelled by a negro, had been landed in the forest at the head waters of the Salt River by his treacherous guide, who then paddled swiftly off down stream. Crockett was too good a hunter to starve in the wilderness, but he was totally unable to reach the appointed place in time, and he gave it up, and with it his chance of election. Hence the phrase "Up Salt River"—meaning that party is hopelessly defeated. Crockett, however, was more lucky ten years after being elected by a handsome majority.

RICHES FROM DAILY SAVINGS.

Very few people are aware of the results to be accomplished in a series of years, by the habit of saving a small amount each day, and putting it at interest. Most persons spend these small amounts on unnecessary and useless luxuries; and because each amount is small, they fail to take any particular notice of it, and utterly fail to estimate the aggregate of such spendings during the course of a life. In this way, many a man spends a fortune without knowing it; and in this way, too, the poor are kept poor.

Most people in this country who enjoy an average degree of health, and who are industrious, earn at least a small surplus beyond their necessary expenses; and if they would save this surplus and put it to interest, they would find in the end a much larger accumulation than they had anticipated. Thousands of them would have a competency, if living to old age, instead of being dependent on the charity of others. We submit the following table, to show what would be the result at the end of fifty years, by saving a certain amount each day and putting it to interest, at the rate of six per cent:

Daily Saving.	*The Result.*
One cent	$ 950
Ten cents	9,504
Twenty cents	19,008
Thirty cents	28,512
Forty cents	38,016
Fifty cents	47,520
Sixty cents	57,024
Seventy cents	66,528
Eighty cents	76,032
Ninety cents	85,527
One dollar	95,041
F ve dollars	475,203
Ten dollars	950,406

The daily saving of sums intermediate between those named in the table, would, of course, yield similar results. There is no man, woman or child living to whom it would not convey a very important practical lesson.

COMMERCE OF THE WORLD.

France exports wines, brandies, silks, fancy articles, furniture, jewelry, clocks, watches, paper, perfumery, and fancy goods generally.

Italy exports corn, oil, flax, wines, essences, dye stuffs, drugs, fine marble, soaps, paintings, engravings, mosaics and salt.

Prussia exports linens, woolens, zinc, articles of iron, copper and brass, indigo, wax, hams, musical instruments, tobacco, wine and porcelain.

Germany exports wool, woolen goods, linens, rags, corn, timber, iron, lead, tin, flax, hemp, wine, wax, tallow and cattle.

Austria exports minerals, raw and manufactured silk, thread, glass, wax, tar, nutgall, wine, honey, and mathematical instruments.

England exports cotton, woolens, glass, hardware, earthenware, cutlery, iron, steel, metallic wares, salt, coal, watches, tin, silks, and linens.

Russia exports tallow, flax, hemp, flour, iron, copper, linseed, lard, hides, wax, ducks, cordage, bristles, furs, potash and tar.

Spain exports wine, brandy, oil, fresh and dried fruits, quicksilver, sulphur, corn, saffron, anchovies, silk, and woolens.

China exports tea, rhubarb, musk, ginger, borax, zinc, silks, cassia, filagree works, ivory ware, lacquered ware, and morocco.

Hindostan exports gold and silver, cochineal, indigo, sarsaparilla, vanilla, jalap, fustic, campeachy wood, pimento, drugs, and dye stuffs.

Brazil exports coffee, indigo, sugar, rice, hides, dried meats, tallow, gold, diamonds, and other precious stones, gums, mahogany and India rubber.

West Indies export sugar, sugar

molasses, rum, tobacco, cigars, mahogany, dye woods, coffee, pimento, fresh fruit and preserves, wax, ginger, and other spices.

Switzerland exports cattle, cheese, butter, tallow, dried fruits, linen, silks, velvets, lace, jewelry, paper and gunpowder.

East India exports cloves, nutmegs, mace, pepper, rice, indigo, gold dust, camphor, benzine, sulphur, ivory, rattans, sandal wood, zinc and nuts.

United States export principally agricultural produce, cotton, tobacco, flour, provisions of all kinds, lumber, turpentine, wearing apparel.

LAMPBLACK.

Its manufacture is very simple, and the apparatus cheaply built. The refuse tar, resin, etc., is put in iron pots or in a furnace, and burned with the least possible admission of air — just sufficient to keep up a low combustion — in order to produce a dense smoke without much flame. The smoke is led into cylindrical, upright chambers, lined with sheepskin, woolen cloth or canvas. The roof is conical in form, made of sheet iron, hanging within the cylinder. This roof is suspended by pulley and chain, and is occasionally lowered to the bottom, in its progress scraping the accumulated lampblack from the sides and depositing it on the bottom, from which it is all removed by means of a hoe or scraper through a small door. A series of these cylinders may be used, communicating with each other by horizontal passages, the roof of the last one being partially open at the apex, to allow for a draft. The lampblack deposited in the last of a series is the finest; but the best of it contains more or less resinous and oleaginous matter, which must be eliminated, to purify the product. This is done by heating the lampblack in cast iron boxes with a close cover, raising and keeping the lampblack at a red heat for two or three hours.

Ivory black, used largely by artists as a pigment, and bone black, employed in the purification of sugars, are the product of the destructive distillation of animal bones. Spanish black is the carbon of cork, and has a brownish tinge. Peach black, resulting from the combustion of peach kernels, has a bluish tint. All these forms of carbon are used as pigments.

THE MANUFACTURE OF ORNAMENTAL FEATHERS.

An interesting account of the manufacture of ornamental feathers, an industry which employs about two hundred and forty working women and apprentices in Vienna, is given in the "Translations of Official Austrian Reports on the Universal Exhibition" in that city. The coloring is done by men, the other processes mostly by women. African ostrich feathers are most usually manufactured. There are white, black, gray and dappled, and are classified according to quality as "prima," "secunda," etc. Other feathers frequently worked are those of the white heron, bird of paradise and marabou (there are genuine marabou feathers and false). The white prime ostrich feather is the finest of all. The feather is cleaned first by a cold soap bath, well washed twice or thrice, and then put into warm soap baths, afterward well washed in cold water, then blued a little, pressed, and swung to and fro in the air until the hairs have spread and the feather is quite

dry. Next, with a small, sharp knife, the strong rib of the back is cut away. The feather loses its stiffness and acquires pliability. With small feathers this is obtained by scraping the rib with glass. Then the hairs on each side of the rib are made to curl in with a blunt knife, and the requisite uniformity of shape is given them by combing them over a slightly warmed iron. Next, in order to hide the rib, the worker, with a blunt knife, twists here and there some hairs of the feather spirally over the rib until it is completely concealed by them. The feather is then threaded with a wire, folded in paper and so completed. The same process is followed with gray and black ostrich feathers, except that the gray are generally, and the black always colored. White feathers are only colored for some particular fashion of color, as rose, violet, etc. If the hair on a feather is not dense enough, or the feather is defective, then two or three feathers are sewn together and curled. This is done with both long and short feathers. Long feathers are called "leaf feathers," "Amazons;" short feathers, generally three of a bundle, are called "panache." Single and sewn feathers are distinguished in both. The hair of the ostrich feather is also much used for the manufacture of fancy feathers—cockades, fringes, etc., are made of these.

The feathers are twined by a machine, and then joined to the hairs of other feathers. These combinations are called "pleureuses," and pieces of ostrich feathers are sewn together to a length of some ells, and called "bordures," and are used to decorate dresses. There is an American ostrich feather called "vulture," which is worked like the "African," but is inferior to it in quality. Tempting white feathers called marabou are much worked. They are used for fancy feathers; the points of small white or colored pigeon feathers and very small fragments of silk and the like are joined on them. "Bordures" for ball dresses are made of them. It is evident from this account that "to show the white feather" is a process which entails some trouble and expense.

LUXURY IN ANCIENT ROME.

If anything more were wanted to give us an idea of Roman magnificence, we would turn our eyes from public monuments, demoralizing games, and grand processions; we would forget the statues in brass and marble, which outnumbered the living inhabitants, so numerous that one hundred thousand have been recovered and still embellish Italy, and would descend into the lower sphere of material life to those things which attest luxury and taste, to ornaments, dresses, sumptuous living, and rich furniture. The art of using metals and precious stones surpasses anything known at the present time.

In the decoration of houses, in social entertainments, in cookery, the Romans were remarkable. The mosaics, signet rings, cameos, bracelets, bronzes, chains, vases, mirrors, mattresses, cosmetics, perfumes, hair dyes, silk robes, potteries,—all attest great elegance and beauty. The tables of thugaroot and Italian bronze were as expensive as the side-boards of Spanish walnut, so much admired in the great exhibition at London. Wood and ivory were carved as exquisitely as in Japan and China. Mirrors were made of polished silver.

Glass-cutters could imitate the colors of precious stones so well that the Portland vase, from the tomb of Alexander Severus, was long considered as a genuine sardonyx; brass could be hardened so as to cut stone.

The palace of Nero glittered with gold and jewels. Perfumes and flowers were showered from ivory ceilings. The halls of Heliogabalus were hung with cloth and gold, enriched with jewelry. His beads were silver, and his table of gold. Tiberius gave a million of sesterces for a picture for his bedroom. A banquet dish of Disilus weighed five hundred pounds of silver. The cups of Dresus were of gold. Tunics were embroidered with the figures of various animals. Paulina wore jewels, when she paid visits, valued at $35,000. Drinking-cups were engraved with scenes from the poets. Libraries were adorned with busts and presses of rare wood. Sofas were inlaid with tortoise-shell, and covered with gorgeous purple.

The Roman grandees rode in gilded chariots, bathed in marble baths, dined from golden plate, drank from crystal cups, slept on beds of down, reclined on luxurious couches, wore embroidered robes, and were adorned with precious stones; they ransacked the earth and the sea for rare dishes for their banquets, and ornamented their houses with carpets from Babylon, onyx cups from Bethnia, marble from Numidia, bronzes from Corinth, statues from Athens,— whatever, in short, was precious or curious in most countries. The luxuries of the bath almost exceeded belief; and on the walls were magnificent frescoes and paintings, exhibiting an inexhaustible productiveness in landscape and mythological scenes.

SLEEP—THE AMOUNT NECESSARY.

Prof. Dickson, in his Essay on Sleep, says the necessary amount must differ in the various tribes, as well as in different individuals, according to numerous and varied contingencies. The average proportion of time thus employed by our race may be stated pretty fairly, I think, at one-third. The allotment of Sir William Jones, slightly altered from an old English poet, does not depart much from this standard:

"Seven hours to books, to soothing slumber seven,
Ten to the world allot, and all to Heaven."

The busy engagement of ambition and avarice may induce men to subtract more or less from their due repose, but any considerable deduction must be made at a great risk to both mind and body. Sir John Sinclair, who slept eight hours himself, says that in his researches into the subject of longevity, he found long life under all circumstances and every course of habit; some old men being abstinent, some intemperate; some active, and some indolent; but all had slept well and long. Yet he gives a letter from a correspondent, recording the case of an old man of ninety-one years of age, who had slept through life but four hours a day. Alfred the Great slept eight hours, Jeremy Taylor but three. Dr. Gooch tells us of an individual who slept only fifteen minutes in the day; but it is scarcely credible. Bonaparte, during the greater part of his active life, was content with four or five hours' sleep; the same is said of Frederick the Great, and of John Hunter. I know familiarly a person whose average has been even lower than this; I have heard his wife say that they were married four years before she had ever seen him sleep.

Seneca is quoted as telling the incredible story of Mecænas, that he passed three years without sleeping a single hour. Boerhave says of himself that he was six weeks without sleep, from intense and continued study. Statements like these demand close examination and clear proof.

Of long protracted sleep there are numerous and wonderful tales, from the story of the Seven Sleepers of Ephesus and their dog — to be found in the early legends of the Church; in the Koran, Chapter of the Cave; all over the East, as Gibbon tells us; and even in Scandinavia — down to the exquisite Rip Van Winkle of our Washington Irving. In the *Philosophical Transactions* we read of one Samuel Clinton, a laboring man, who frequently slept several weeks at a time, and once, more than three months without waking. In the *Berlin Memoirs of the Academy of Sciences*, there is a curious story of a lady of Nismes, who fell asleep irresistibly at sunrise, woke for a brief interval at noon, fell asleep again, and continued in that state until seven or eight in the evening, when she awoke, and remained awake until the next sunrise.

BUTTER AND CHEESE.

The ancient mode of making butter was the same as practiced by the Bedouin Arabs and the Moors in Barbary at the present day. The cream is placed in a goatskin, and agitated by hand or by treading it with the feet. Butter and honey mentioned by Isaiah vii, 15, is to this day an article of food in the East. The word *shamea*, rendered *butter* in our translation of the Bible, seems to have referred to several forms of milk and its productions, such as sweet or sour milk, cream, thick milk, curd, or butter. It was used for anointing, and it is said that it was the butter of kine and milk of sheep that made Jeshurun wax fat and rich. Abraham took butter and milk and the calf which he had dressed and set before three strangevisitors. Sisera asked for water, and Jael, the wife of Heber, the Kemte, gave him milk, and brought forth butter in a lordly dish. The Turks prefer sour to sweet milk. Butter is mentioned by Herodotus. (484 B. C.) He says they pour the milk into wooden vessels; cause it to be violently stirred or shaken by their blind slaves, and separate the part that arises to the surface, as they consider it more valuable and more delicious than that which is collected below it. Hippocrates (460 B. C.) describes the process more clearly, stating that the lighter portion (butter) rises to the top, and the other part was separated into a liquid and solid portion, (*curd* and *whey*), of which the former was pressed and dried, (*cheese*). Strabo speaks of butter being used by the Ethiopians. Pliny describes the use of butter and cheese by the barbarous Germans. The Romans used butter for anointing, the Germans for hairdressing, and the Egyptians for burning. Butter was used instead of oil by the Christians of Egypt, in the third century. Cheese was also used among the pastoral nations of Canaan and Asia Minor, also among the Scythians. Hippocrates, (460 B. C.) states that the mode of preparing this food from milk, was discovered by the Scythians at a very early date. Cheese is mentioned several times in the Old Testament Scriptures, but each time under a different name. Butter and cheese both form a staple article of diet to many nations of the globe.

RAISINS.

Spain is the greatest producer of raisins. Those styled Valencia raisins find great favor with all classes of English people. A few years ago a crop of 12,000 tons, for the supply of the world, was considered large; now London receives 12,000 tons out of a total of 20,000 tons that are grown. These raisins also find a large market in the United States and Canada. The improvement in the article most observable of late years, is that of removing the stalks before shipment. As no useful purpose has been found as yet for the stalks, they are generally burned. Muscatel, or table raisins from Malaga, vary widely in quality. They are known as "layers," "bunch," and "loose" raisins, the best being picked from the stalk. This sort is largely used in America. The finest growth of Muscatels come to this country in decorated boxes, with colored paper and lace edgings, increasing the expense of packing to the extent of $1.25 per ton.

The Sultana raisins, produced in Turkey, are cured in the sun, a slight sprinkling of oil being employed to prevent the too great evaporation of the moisture, and also to assist in the preservation of the fruit when packed and shipped. The Germans are also large consumers of these raisins, and they constitute an article of considerable traffic between Trieste and Smyrna. The Eleme raisins are also produced in Turkey, and are used chiefly for export to distant colonies, and for ships' stores. As their name implies, they are picked raisins, and are packed specially for ship use from the vines of the Curaboura and Vouria districts in Asia Minor. The greater proportion of the raisins from Smyrna are known as "Chesme," the name of the island near the mainland. These are the Turkey grapes, pure and simple, without selection, picking of stalks, or any manipulation whatever. They find a ready market in Eastern countries, but are the special feature of fruit-trading between Turkey and German ports. There are vast districts in Persia where raisins are cultivated, but the difficulty of getting them to market is so great that it does not pay to export; consequently they are used for distilling and local purposes. At the Cape of Good Hope, raisins are produced which find a market chiefly in Australia.

THE COW TREE.

"Among the many curious phenomena which presented themselves to me in the course of my travels," says Humboldt, "I confess there were few by which my imagination was so powerfully affected as by the cow-tree. On the parched side of a rock on the mountains of Venezuela grows a tree with dry and leathery foliage, its large, woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower; its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts, provided with large bowls, to receive the milk, which grows yellow, and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock."

THE OLDEST PIANO IN AMERICA.

The oldest piano in this country, so it is supposed, has recently been presented to the New Haven Historical Society, by Mr. C. M. Loomis, the publisher of *Loomis' Musical Journal,* New Haven, Conn. This instrument was made by an Italian firm in the city of London, in the year 1786. The mechanical action is similar to pianos of the present day. The wires are small and placed together. There is a peculiar sweetness of tone to many of the chords, which would indicate that the piano was a good one in its day. It seems that an English lady named Mrs. Sarah Palmer imported the piano to this country about 1796. Soon after it came into the possession of a family by the name of Bakewell, where it remained for a period of about sixty years. Finally, Mr. Loomis obtained some knowledge of the facts narrated above, and tracked out the instrument, which he purchased for a high price, simply as a curiosity.

CRUCIBLE.

Crucib es are mentioned by Greek authors and are shown in the ancient Egyptian paintings. In the sixteenth century, Agricola the celebrated metallurgist, and Glauber, a noted chemist, made their own crucibles. Metallic crucibles are made of platinum, silver, or iron. Hessian crucibles are made of the best fire-clay and coarse sand. At Picardy in France, they make an excellent crucible of a sort of kaolin and fine sand. In the early part of the seventeenth century, the Dutch made what were known as "blue-pots" or "black-lead pots" of clay and graphite. In 1827, Mr. Joseph Dixon began the manufacture of crucibles by mixing the graphite known as plumbago, found in New Hampshire, with a clay used by the glass makers for melting pots. He afterward, about 1830, adopted the Dutch pipe-clay to mix with the Ceylon graphite which was brought home by the captains of India ships as curiosities. They are now made at the Dixon works, Jersey City, New Jersey, of all sizes, from those that hold but two ounces up to six hundred pounds capacity.

THE ORIGIN OF MUSIC.

The discovery or origin of Music has by some writers been credited to the Egyptians, doubtless from the fact that, as far as we know, they were the most successful of the old nations in the cultivation of the art. It must not be overlooked, however, that, after all, our records of the world's history cover a comparatively small period, and that on the subject of music especially we have but scant data to go upon. It cannot be denied that the art flourished in considerable perfection among the Egyptians, who, we know, constructed various instruments, mainly for the accompaniment of song. For these instruments it is said the Egyptians were indebted to the river Nile, after an inundation of which a quantity of reeds would be left behind on the banks, and the wind whistling through these reeds suggested ideas for flutes and other wind instruments. As a great deal of ancient history has come down to us disguised in fable, so we are told that Mercury, in one of his rambles, once struck his foot against the shell of a dead tortoise, and finding it delightfully sonorous, it occurred to him to construct a lyre in the shape of a tortoise. Recent discoveries in the bot-

tom of Swiss lakes, in caves, and so forth, go to prove that musical instruments were in use among other ancient tribes and nations, entirely distinct from, and independent of the Egyptians.

It is, therefore, quite safe to assume that the origin of musical sounds is of twin birth with the origin of language. But of its history and development but little will be known until the advent of some musical Max Mueller.

TOBACCO.

The *tobacco* plant is a native of America, but is cultivated in many other countries. It grows to the height of five or six feet, with a hairy and clammy stem. The leaves are large, the lowest being of the least value. When fresh, they possess little odor or taste. The plants when ripe are cut off above their roots and dried under cover; the odor becomes strong and acrid. The leaves are stripped off, sorted and packed in hogsheads for shipment. When well cured, they are of a yellowish green color. Tobacco is used in various ways. The leaves rolled up in a peculiar form constitute *cigars,* for smoking. Ground to a powder, they are used as *snuff,* while for chewing the leaves are pressed into cakes and masses, or reduced to small fragments for the pipe.

This plant contains principles which are among the most virulent poisons known. By various processes these may be extracted. To the most important of them the name of *nicotine* is given, from that of *Jean Nicot,* who, in 1560, sent seeds of the plant from Portugal, where he was at the time the French embassador to Catherine de Medicis, thus introducing it into France. The botanical name, *Nicotiana Tobacum,* is also derived from the same source.

Tobacco was first discovered by the Spaniards in St. Domingo in 1498. It was first carried to England in 1565, by Sir John Hawkins or Sir Walter Raleigh, and has ever since been growing in importance as an article of commerce, having been introduced more or less into every part of the world. The name is thought by some to have been given in consequence of its early importation from Tobago, one of the Carribee Islands. Others think it received its name from *Tobaco,* a province of Yucatan; and still others, that it was called from Tobasco, in the Gulf of Florida. Humboldt has shown that *Tobacco* was the term employed in the Haytian language to designate the pipe used by the natives in smoking, the name having been transferred by the Spaniards to the plant itself, and adopted by other nations.

POSTS AND MAILS.

The name of *post* is said to be derived from the Latin *positus,* which means *placed,* because horses were anciently placed at certain distances apart for the purpose of transporting messengers or letters. These messengers, who traveled on horseback, were generally in the service of the government. The first posts date back to the time of Darius I. of Persia, B. C. 522, who, we read, caused couriers with saddle-horses to stand ready at different stations a day's distance apart, throughout the empire, in order to receive reports from the provinces without delay. In some of the Eastern countries *carrier pigeons* were used in early times to convey informa-

tion, but never to any great extent. A *pigeon post* was established and sustained at great expense for half a century or more by some of the Caliphs of Bagdad and other Mohammedan princes, but at length the birds fell into the hands of enemies, and the system was destroyed. During the late conflict between the French and Prussians, the pigeon post was again brought into service. In ancient times the dispatch was necessarily short, as the slightest weight was an impediment to the bird's flight. Modern science and skill have remedied this by applying to it the photographic art. No less than 3,500 dispatches of twenty words each could be carried by one of these carrier pigeons. At the end of the route the dispatches were read with the utmost facility. A page of the *London Times* has been compressed into the space of less than an inch. When commerce began to flourish in modern times, *post coaches,* or *stages* were employed, and at the present time, where the railroad is not yet available for the service, letters and other mail matter are thus conveyed, the Government forming a contract with the owners of coaches and other public vehicles to this effect. In England, a guard accompanies the mail for its protection. The first regular post-office was established in England in 1654, by Cromwell. The office of Postmaster-General in England was first conferred by Queen Elizabeth upon Thomas Randolph, a gentleman who had aided essentially in the establishment of the mail system in Great Britain. In this country the first post-office was established by an Act of Parliament in 1710. After the Revolution this department came under the control of the new Government, and was placed by the Constitution in charge of Congress with power to establish post-offices and post-roads, and provide for the safe transmission of mail matter all over the country. The entire business is under the direction of the Postmaster-General at Washington. The word *mail*, as applied to our postal system, comes from the French *malle*, a trunk, or similar word in several other modern languages, having the significance of sack, bag, budget, etc. Hence, the contents of such a bag or sack have come to bear the meaning of the original word.

THE FIRST BANK.

The first bank, of which we have any reliable record, was established in Italy, A. D., 808, by the Lombard Jews, of whom many afterwards settled in Lombard street, London, where many bankers still reside. The name is derived from *banco*, a bench which was usually erected in the market place for the exchange of money. The English merchants, lacking a safe place to deposit their cash, first used the Mint in the Tower of London for this purpose, but the credit of the mint was destroyed when King Charles I. laid his hands upon the money, and appropriated it to his own use in 1640. The traders were thus driven to seek some other place of security for their gold, not daring to keep it in their own possession, as their clerks and apprentices frequently absconded with it. In 1645, they were induced to lodge it with the goldsmiths of Lombard street, who were provided with strong chests for their own valuable wares, and this became the origin of banks in England.

FANS.

Fans are a very ancient invention, being found painted on the walls of tombs at Thebes, in Egypt, showing their use more than 3,000 years ago. The forms were different, but some were very beautiful. They were originally made of feathers, and bound together like the tail of a peacock when spread out. In 1560, Catherine de Medicis introduced the fan in France, where it has long been an article of manufacture and commerce. The Chinese are the only great rivals of the French, and the two nations have in a good degree the monopoly of the business. In China the manufacture is chiefly confined to Canton and a few other towns. In France, Paris is the chief centre of the fan business, which gives employment to a great number of men, women and children. The Chinese and Japanese produce the lacquered bamboo, and palm-leaf fans, sometimes of large size, to serve for parasols. The palmetto, with the natural stem for a handle, is a very durable, cheap and convenient fan.

HISTORY OF SHOES.

The antiquity of shoes is, no doubt, as early as the civilization of mankind. We find that they were worn by the ancient Egyptians; several of their actual shoes, having been preserved to the present day, may be seen in the British Museum. They are formed of matting, the bark of the papyrus, leather, and other materials. Shoes were also used by the Greeks and Romans, though they generally wore sandals, which were merely soles tied on the feet with thongs. It would be endless to mention the variety of shoes that have been in use at different times, and among various nations. The most simple kind of shoes appears to have been merely a piece of leather, bound round the foot, and such are still used in remote sections in the highlands of Scotland, where they are called *brogues*. In the reign of Edward IV., shoes were pointed at the toes, and had long beaks, of four or five inches, turned up and fastened to the knee by a chain. Afterward they were quite round at the toes, and ornamented with spangles. In the time of Charles I., the toes were made quite square. The Greeks seldom wore shoes, but when they do occur in Greek or Roman sculpture, they are round at the toes. The shoes of olden times do not appear to have been blacked, which color is now most universaly used.

THE HISTORY OF TEA.

The beverage so named, and now become almost a necessary of life in a great part of the British Isles, was wholly unknown to the Greeks and Romans, as likewise to our ancestors, previous to the middle of the seventeenth century. The date of its beginning to be used in this country is ascertained by the fact that a duty of eight pence per gallon was in 1660 laid on the infusion of tea made and sold in the coffee-houses in London, and that its use had not at that time become very general, is shown by an entry in the published diary of Mr. Pepy's Secretary to the Admiralty, September 25, 1661. "I sent for a cup of tea (a China drink) of which I had never drank before." It does not appear clear by whom tea was first imported into Europe. We learn from Mickle, that the Portuguese, who had intercourse with China in 1517, were

allowed to purchase silks, porcelain and tea, but we have no evidence how far they availed themselves of the privilege with respect to the latter. That they were acquainted with the use of an article in such general consumption among the Chinese, is rendered very probable from the circumstance that they are the only European nation who designate the plant by its national name of *tescha*, all others applying to it the provincial name of *te*, derived from the dialect of Tokien, the Province with which the English and Dutch maintained their earliest intercourse. The Dutch arrived for the first time in China in 1601, but there is no authentic evidence that either they or the English, who appeared about the same time in the Eastern seas, imported tea during the first half century of their intercourse with the East. No doubt, however, from the facts we have noticed, it was brought to Europe about that time, and that the taste for it was beginning to spread in 1660. It was, however, so rare a commodity in England in 1664, that the English East India Company at that time brought two pounds two ounces of it to His Majesty, and it was not imported much from China but from Holland. In 1666, Lord Arlington and Lord Ossey brought over from the latter country a quantity, at which time it was sold in England for sixty shillings a pound. The Dutch procured it from Bantam, then one of the principal emporiums of India, and much frequented by the junks or ships of Canton. But it was scarcely then considered an article of commerce. In 1667, we find that the East India Company gave their first order to their agent at Bantam, to send home 100 pounds of tea for the purpose of "making presents to their friends at court." From that time the consumption increased, and in 1678 nearly 5,000 pounds were imported. The demand has steadily increased, until now the consumption is enormous of this universal beverage.

ABOUT ORANGES.

A French paper, in an article on oranges, says :

"In no city of the world are orange blossoms so generally employed as in Paris; chemists use every part of pistil, leaves and petals for pharmaceutical purposes; perfumers extract an essence called 'Portugal' from the rind of the fruit, and distil the most delicate *eau-de-fleur d'oranger* for the skin; confectioners frost the buds over with sugar, and employ the water for pastilles; cooks owe the success of a number of *entremets* to its flavor, and many are the invalids who feel relieved by the soothing effect of orange-flower tea. Any traveler who has visited the department of the Var will remember that every other cottage in the village around Grasse bears the sign of an orange or orange tree, painted over the door, for every inhabitant either sells or manufactures a liquor or an essence from the product of the trees or flowers. It has been remarked that nature was never more bounteous than when she showered down perfumes on the valleys and environs of Grasse, the streets of this busy little town being the filthiest and narrowest of any in the South of France.

Although the orange has now become as common a fruit with us as the apple, there is a poetic fancy connected with Southern orange groves, which our Northern oranges do not inspire. The Seville orange goes by

the name of naring, whence the Spanish *naranja*, and our derivate, orange, but it is not a native of Spain. The original orange tree was conveyed from India to Palestine and Syria, whence the crusaders brought it to Marseilles, with the apricot and Damascus plum. The Genoese were the first to discover its value as an article of trade, and as early as 1336 we read of a prince purchasing orange trees at Nice, but the oranges sold were the bitter and intensely sour fruit, which royalty, in such distant days, did not disdain to eat with salt!

We read that Charles IX. of France, was astonished at the thickness and beauty of the orange forests of Hyeres. The French called these wild oranges "bigaradiers," just as they now call the wild cherry "bigarreau." The sweet orange was first brought from China, and the earliest of them grew in Portugal, Africa, and along the Mediterranean, the Blidah and Maltese orange soon becoming famous. There are four historical orange trees — one at Nice, in 1779, which had attained the prodigious height of fifty feet, and under the shade of which forty guests sat down to table. An orange tree is still shown at the Convent of St. Sabine, a little way out of Rome, which was planted by St. Dominic, in 1260; there is another at the Fundi Monastery, Naples, planted by St. Thomas d'Aquinas, and the fourth is the Grand Bourbon, at the Versailles Orangery. The history of the Grand Bourbon is recorded in the Royal Archives, as follows: In 1421, a Princess of Navarre planted within a box, in the garden of Pampenula, the five small seeds of a bitter orange. In 1499, Catherine de Foix, being desirous to offer to Anne de Bretagne a very rare present, sent her the box in which the five seeds had grown up and formed five small orange trees; she also sent the history of their origin and culture. In the course of time these trees came down to the Constable de Bourbon, who greatly prized them, and had them transplanted, as his predecessors had successively done, and thus promoted their growth. These orange trees were the pride of his garden at the Chateau de Chantelles-en-Bourbonnais. When Francis I. confiscated the property, the trees were carried to Fontainebleau.

We find them mentioned in Dangeau's *Journal*, under the date of the 7th of June, 1687: "Toward five this afternoon the King went on foot to the orangery, whither the fine orange trees have been conveyed from Fontainebleau." The tree referred to in the inventory of the Constable's possessions was put down as "an orange tree with five branches, brought from Pampeluna." Three of these five stems have grown together, and form but one trunk, but the other two part some way up the trunk, and form two separate orange trees.

One of the most singular botanical facts related of any tree is, that the same orange bush often contains flowers, green fruit and fully ripe fruit at the same time, and few know that this it is which caused early poets to call it the emblem of brides, "for," as says an old Latin chronicler, "my bride is my children's mother, a comely flower by the side of her small fruit."

Another curious fact in regard to orange trees is, that they can be transplanted at any age, even very old trees. In tropical countries, the best transplanting seasons are December and June, on account of the frequent rains. There are several methods of

rearing sweet oranges. Many plant the seed and wait for five or seven years before the fruit grows; this is the long, slow way. The best is to obtain sour orange trees of the proper size, and bud them with sweet orange buds in the same way as peach trees. The ordinary time of their bearing after that is three years.

The sale of artificial orange flowers in Paris brings in several millions yearly, and employs many hundred hands, both for manufacturing and exportation. Kid, wax and muslin are the materials employed with such rare art and ingenuity.

DATES.

Dates are the fruit of a palm tree which abounds in Egypt, Barbary, Arabia, Persia, and other neighboring countries. It is a tall, majestic tree, and highly regarded in the East, both for its beauty and utility. It reaches the height of sixty feet, having a rugged trunk terminated with a tuft of leaves six or eight feet long. The flowers come out in large bunches from the trunk between the leaves, and produce a cluster of oval berries with a thick, sweet pulp, and enclosing a hard, oblong stone, which has a furrow on one side. When quite ripe, these berries are soft and of a red color. They are gathered and formed into a hard mass or cake by pressing them into large baskets, containing about two hundred pounds. In this form the fruit is exported. In retail trade, it is cut out of the baskets and sold by the pound. From the leaves are made baskets, bags, mats and brushes. The trunk is used for timber, and the fibrous mass at the base of the leaves is twisted into cordage, and employed in rigging small vessels.

ICEBERGS.

Few sights in nature are more imposing than that of the huge, solitary iceberg, as, regardless alike of wind and tide, it steers its course across the face of the deep, far away from land. Like one of the frost giants of Scandinavian mythology, it issues from the portals of the North, armed with great blocks of stone. Proudly it sails on. The waves that dash in foam against its sides shake not the strength of its crystal walls, nor tarnish the sheen of its emerald caves. Sleet and snow, storm and tempest, are its congenial elements. Night falls around, and the stars are reflected tremulously from a thousand peaks, and from the green depths of "caverns measureless to man."

The visible portion of an iceberg is only about one-ninth part of the real bulk of the whole mass; so that if one be seen 190 feet high, the lowest part may, perhaps, be away down 1,800 feet below the waves. Now it is easy to see that such a moving island will often grate across the summit and along the sides of the submarine hills; and when the lower part of the berg is roughened over with earth stones, the surface of the rock over which it passes will be torn up and dispersed, or smoothed and striated, while the boulders embedded in the ice will be striated in turn. But some icebergs have been seen rising 300 feet over the sea; and these, if their submarine portions sank to the maximum depth, must have reached the enormous total height of 2,700 feet. By such a mass, any rock or mountain-top existing 2,400 feet below the surface of the ocean would be polished and grooved; and succeeding bergs depositing mud and boulders upon it, this smoothed

surface might be covered up and suffer no change until the ocean bed should be slowly upheaved to the light of day. In this way submarine rock surfaces at all depths, from the coast-line down to 2,000 or 3,000 feet, may be scratched and polished, and eventually entombed in mud. It is upon this theory only that we are able to account for the many huge boulders that lie scattered about upon the mountain, valley and plain.

DRESDEN PORCELAIN.

Many readers will be astonished at the statement that no porcelain was ever made at Dresden. The celebrated factory always was, and still is, situated at Meissen, on the Elbe, a good twelve miles from the capital of Saxony. Augustus II., the ruler of the Electorate, and chosen King of Poland, was a money-loving prince,—not to keep cash, but to spend it with lavish liberality, and constantly on the look-out how to increase his revenues. Fortunately, instead of fleecing his subjects for this otherwise laudable purpose, as many of his compeers did, he tried to develop the natural resources of his dominions. First, he engaged the Count of Tschirnhaus, a celebrated philosopher and scholar at the time, and set him to work to introduce some manufacture which could fill his exchequer. But soon he found this process too slow, and wished for some adept or necromancer who was to change stones into gold. There were many of the Dousterswivel tribe roving about Germany, and one of them found his way into Saxony. Jean Frederick Bottger, with whose name the invention of hard-paste porcelain in Europe is connected, was born at Schleitz, in 1682. His father, a master of mint there, apprenticed his son to an apothecary in Berlin. But an honest trade did not suit young Bottger's tastes. He gave himself up to the study of secret sciences, and was appointed royal alchemist by William I., of Prussia. Of course he could not satisfy the expectations of his royal patron, and after a time took flight to Wittemberg. Here he was arrested, but his extradition was refused by the Elector of Saxony, who was delighted to get hold of the celebrated adept. Augustus II. had Bottger conducted to Dresden under military escort, put him in confinement, and fed him well for three years, to seek for the philosopher's stone. No result nor benefit rewarded the patience of the Elector. Of the sixty million ducats which Bottger had promised to his princely dupe, not a single piece appeared, and in 1705 the unsuccessful adept took again to his heels, and fled to Ems, in Austria. Brought back to Dresden, he had to continue his experimental labors in durance vile, and ultimately succeeded in producing a fine red stoneware, resembling jasper or agate. Specimens of this kind — busts, coffee and tea ware, polished by the lapidary, and decorated with Chinese designs in gold and silver leaf — are not unfrequently met with. They generally bear a Chinese mark impressed, and are distinguishable by their weight, from the similar Boukhara stoneware. In 1708 Count Tschirnhaus died, and the year after Bottger discovered kaolin in his hair-powder, and the method of making white porcelain. The first piece, a white plate of Bottger's manufacture, is still preserved in the Japanese Museum at Dresden, and marked with King Augustus' monogram.

The kaolin in Bottger's powder-box

turned out to come from Aue, in the Erzgebirge, where Hans Schorr, an iron master, had discovered the same by accident.

Augustus the Strong now (1710) proceeded to establish a great porcelain manufactory on the Albrechtsburg at Meissen, and Bottger was nominated technical director, but still kept under lock and key. It took three more years to bring the invention to perfection, and in 1713 the first painted and enameled porcelain of Meissen, appeared at the Leipsic fair. Bottger was now liberated, after sixteen years' captivity in more or less gilded prisons; but his constitution was undermined by fast living, and he died on March 13, 1719.

After Bottger's death, Horoldt of Jena was appointed director, and under him the artistic development of the Meissen works steadily progressed. Magnificent services, elaborately painted gilt, as well as vases, were turned out.

In 1731, Augustus constituted himself nominal director of his pet factory, and to this so-called King's period, extending over thirty-two years, until the Elector's death in 1763, belong the finest productions of the Meissen porcelain works.

The famous Count Bruhl, who kept 1,500 suits of clothes, with wigs and snuff-boxes to match, was appointed administrator, and brought his extravagant but by no means unrefined taste to bear upon the royal factory.

Prior to Bottger's invention, the King had spent fabulous sums for Oriental porcelain. To Frederic William of Prussia, he handed over a whole regiment of dragoons in exchange for twenty-two monster vases, and ordered porcelain services in China, decorated with the arms of Saxony and Poland, to the value of one million of thalers. Now that he could produce porcelain in his own dominions, his liberality in giving away knew no bounds. He presented the Countesses of Kosel and Donhoff, his favorites, with the choicest services, and every court in Europe received magnificent gifts in Mossien porcelain. To collect specimens of *vieux Saxe* became a mania with the fashionable world of Europe. The most heterogeneous articles of artistic church and household furniture, such as candelabras, organs, clock-stands, buttons, tables, violins, mirror and picture-frames, even coffins, were made of porcelain.

But what perpetuated the fame of the Meissen works were the figurines modeled by Joachim Kandler, between 1731 and 1775. All the innumerable vases, figures, groups and animals, which are still the delight of connoisseurs for their life-like imitation of nature and faultless decoration, emanated from the hands of this clever artist. Nothing was too great or too little for Kandler to undertake to model, from the colossal equestrian statue of his Master and the Twelve Apostles, all life size, to the charming figurines *a la* Wattern, the Skye Terrier of the Porcelain King, the Pet Dogs of Catherine II., and the minute Pug—the latter still reproduced in countless numbers from the old models. Celebrated sets were the Monkey Orchestra and the Carnival of Venice, escorted by upwards of a hundred different and independent figurines, representing the various professions and trades—two carts, each drawn by four horses, full of masked personages, and the centre formed by a large clock with rococo scrolls.

Kandler likewise modeled a whole

menagerie of animals of life size, of which, according to Mr. Chaffers, Lord Hastings, at Melton Constable, possesses the most complete collection.

The members of the Kandler menagerie have become so rare, that some of them were not even recognized by the cunning London dealers when offered for sale at a second-rate auction some years ago. They were knocked down for a mere trifle, to the great benefit of the adventurous buyer.

The price Meissen porcelain commanded in England, even at the time of its manufacture, may be gathered from an article in the *London Magazine* of May, 1753: it says, "Table services may be had from 100 to 1,000 guineas, according to the quantity, size, and nature of the painting they are composed of. Those most commonly bought are about the value of 160 or 200 guineas. The plates are from 8s. to 24s.; and the tureens, dishes, bowls, etc., according to their bigness, etc. The sets of porcelain for tea, coffee and chocolate may be had from 15 to 60 guineas. The single figures, about 15 in. high, are rated at from 10 to 20 guineas, and those of 5 or 6 inches in as many pounds. When they exceed these sizes, the figures grow dearer.

At the present day a fine old Dresden figure is considered cheap at 40 and 50 guineas, and large groups are purchased for hundreds of pounds.

Entirely white porcelain, without decoration, was the most esteemed during the King's period, and reserved for the Elector's use, or for presents to foreign princes. Specimens of this white porcelain, engraved with a diamond, by Baro Busch, Canon of Hildesheim, are eagerly sought for by collectors, and bring exhorbitant prices. The Duke of Brunswick possesses a whole service of it, valued at £10,000.

About 1754, Ernst Dietrich, of Weimar, or Dietrici, as he called himself, became director of the Meissen porcelain works, and engaged the principal artists of rival factories—Lusch, of Frankenthal, Breicheisen, of Vienna, and the French sculptor, Francois Acier. The latter introduced the Sevres style of decoration. The superiority of colors, however, which had characterized the Meissen works during the first half of the eighteenth century, in comparison with the French porcelain, could not be kept up any longer.

Towards 1774, until 1814, the Count Marcolini took the place of Dietrici, and, under his direction, the well-established fame of the royal works was well sustained—to be, as it seems, irretrievably lost after Marcolini's death, under Von Oppel (1814 to 1833), and Kahn, his successor. With modern Dresden we have nothing to do; it is so much inferior, in every way, to *vieux Saxe,* that it does not deserve the attention of collectors.

Meissen or Dresden porcelain bears a variety of marks, all in blue, under the glaze. The oldest seems to have been the monogram A. R., signifying Augustus Rex. It was affixed to pieces intended for royal use, between 1709 and 1712. This mark is likewise found on specimens of modern origin, which, however, by their inferior decoration, are easily distinguished from the old models. In rare cases, the monogram is surmounted by a crown.

The caduceous mark was used between 1712 and 1720, on pieces intended for sale, and made under the direction of Bottger.

Horold appears to have introduced

the Electoral swords as marks. They occur as early as 1716, and continue to be used as the principal mark on Dresden porcelain all through the eighteenth century.

Specimens made during the King's period (1731—1763) are generally marked with a dot between the crossed swords, and considered as the most valuable by collectors.

The same mark was used during the direction of Dietrich, 1763—1774; and under Marbolini, 1774—1814, a star was sustained for the dot.

The initials M. P. M. and K. P. M., which sometimes are found on old Dresden porcelain, but more frequently on specimens of modern make, signify "Meissner Porcellan Manufactur," and "Konigliche Porcellan Manufactur."

Pieces which have been sold in the white state, or specimens spoilt in the firing, are marked with one or more cuts in the glaze, above or through the crossed swords, and may therefore easily be distingushed from pieces painted by Dresden artists.

A special mark was used for a service made expressly for the King's favorite, the Countess Kosel, but specimens are hardly ever offered for sale.

The Dresden mark of crossed swords has been frequently copied by other porcelain manufacturers,—as by Locre de la Courtille, Jacob Petit, and M. Cloos, of Paris.

In England, nearly every china factory forged this celebrated mark. It is most frequently found on Bristol, Worcester and Derby porcelain, and occasionally on Colebrookdale, and other inferior Staffordshire china.

The Dresden manufactory itself uses all the old marks for its comparatively valueless modern porcelain, and a collector is utterly lost if he relies only on marks, and does not take into consideration style and finish of modeling and decoration.

The surest safeguard, however, against mistakes and deceptions remains—the artistic feeling which cannot be taught, but only acquired by long experience, and by comparing undoubted old specimens with modern imitations. A connoisseur detects the difference at a glance, whilst a tyro generally picks out the wretched forgery for its glaring colors and brighter aspect.

ORIGIN OF THE DOLLAR MARK.

A writer in the *Atlantic Monthly* has a curious paper on the origin of the dollar symbol, ($). In brief, his theory is, that the two upright marks may be traced back to the pillars of Hercules, and the S-like figure is the scroll entwined around them. According to tradition, when the Tyrian colony landed on the Atlantic coast of Spain, and founded the ancient city of Gades, now Cadiz, Melcarthus, the leader of the expedition, set up two stone pillars as memorials, over which was built a temple of Hercules. As the temple increased in wealth, the stone pillars were replaced by others, made of an alloy of gold and silver, and these two pillars became, in time, the emblem of the city, as a horse's head became that of Carthage. Centuries later, when Charles V. became Emperor of Germany, he adopted a new coat of arms, in which the pillars of Gades or Cadiz occupied a prominent position in the device. Hence, when a new coin, the collonnato, was struck at the imperial mint, it bore the new device—two pillars, with a scroll entwined around them.

This coin became a standard of value in the Mediterranean, and the pillars and scroll became its accepted symbol in writing.

The two horizontal bars which cross the symbol of the English pound sterling, are also thought to have a similar origin. In the same paper, the symbolic origin of the pillars of Hercules is traced far back into the remote era prior to the dispersion of the human race from its Asiatic birth-place. They are identified with the household pillars of the Scandinavians, and the idea from which the concrete embodiments spring, is to be found alike in the Sanscrit Vedas, and in the glowing imagery of the Hebrew poets. They are the symbols of day and night, or light and darkness, which, to the dawning intelligence of the Arian races, were evidences of the Omnipotent, and to the Jewish patriarchs, the work of a revealed Creator.

SENSATION OF STARVING.

For the first few days through which a strong and healthy man is doomed to exist upon nothing, his sufferings are perhaps more acute than in the remaining states—he feels an inordinate, unspeakable craving at the stomach, night and day. The mind runs upon beef, bread, and other substantials, but still, in a great measure, the body retains its strength. On the third and fourth days, but especially on the fourth, this incessant craving gives place to a sinking and weakness of the stomach, accompanied by a nausea. The unfortunate sufferer still desires food, but with loss of strength; he loses that eager craving which is felt in the earlier stages. Should he chance to obtain a morsel or two of food, he swallows it with a wolfish avidity; but five minutes afterward his sufferings are more intense than ever. He feels as if he had swallowed a living lobster, which is clawing and feeding upon the very foundation of his existence. On the fifth day his cheeks suddenly become hollow and sunken, his body attenuated, his color is ashy pale, and his eye wild, glassy, cannibalish. The different parts of the system now war with each otner. The stomach calls upon the legs to go with it in quest of food; the legs, from very weakness, refuse. The sixth day brings with it increased suffering, although the pangs of hunger are lost in an overpowering languor and sickness. The head becomes giddy—the ghosts of well-remembered dinners pass in hideous procession through the mind. The seventh day comes, bringing an increased lassitude and further prostration of strength. The arms hang lifelessly, the legs drag heavily. The desire of food is still left, to a degree, but it must be brought, not sought. The miserable remnant of life which still hangs to the sufferer, is a burden almost too grievous to be borne; yet his inherent love of his existence induces a desire still to preserve it, if it can be saved without a tax upon bodily exertion. The mind wanders. At one moment he thinks his weary limbs cannot sustain him a mile, the next he is endowed with unnatural strength, and if there be a certainty of relief before him, dashes bravely and strongly forward, wondering whence proceeds his new and sudden impulse.

Cannon first used at the siege of Algeziras, 1342. Muskets in use, 1370. Pistols in use, 1544.

THE WISDOM OF THE EGYPTIANS.

The moderns are accustomed to pooh-pooh a good deal at people so unfortunate as to live before this nineteenth century; but just think what some of these remote people and times did manage to find out and accomplish for themselves. There was Egypt—oldest and wisest of the nations—what a record for her is deciphered. in the last fifty years of her past.

What did the old Egyptian know about the oldest of the arts—about farming? He knew how to manage his great river—the one source of moisture and fertility in that climate—so as to turn the desert beyond its banks into a garden, and make Egypt a storehouse and granary for the surrounding nations. He built reservoirs so huge as to retain sufficient water from the overflowing river to feed it when it subsided—a lake four hundred and fifty miles around and three hundred feet deep—and this fitted up with a skillful system of floodgates, dams and locks. These were water-works on a stupendous scale, truly.

As to what he knew about building, who has not heard of his pyramids, those vast masses, some of which were old in the time of Abraham, and yet built with such faithfulness and skill, that the masonry is still perfect? He knew how to quarry and move huge blocks of stone, ninety feet in length, and then cover them with accurate and beautiful chiseling. The whole land was full of these wonderful statues, obelisks, tombs and temples.

About manufacturing, he knew how to weave linen so fine that each separate thread was composed of three hundred and sixty-five small threads twisted together. He knew how to dye it in purple, and blue, and scarlet, and how to embroider it. He knew how to get iron and copper from mines at Sinai, and how to make useful tools of them when obtained.

But what did he know about science? He understood geometry well enough, at least, for land surveying. He understood the rotundity of the earth, the sun's central place in the solar system, the obliquity of the ecliptic. He could foretell eclipses, the position of the planets, the true length of the year. He had found out a method of notation—two of them indeed, the decimal, and the duodecimal. As for chemistry, its very name (from Chemi, which means Egypt) tells us where it was first studied. No wonder that the Egyptians got the reputation, among their more ignorant neighbors, of being magicians. As for books, the old Egyptians made paper and wrote on it, and we have now papyrus rolls made in the time of the early Pharaohs; but he went on further to turn his buildings, his obelisks, even his coffins, into books, inscribing them with histories and biographies, by representing on them, through paintings and sculpture, all his occupations and beliefs, his hopes and fears.

One asks in wonder where he got all this knowledge. Ancient Greece went to him for it, just as the American goes to Germany. We can trace the germs, at least, of our science and art to nations removed from us by ages; but whom did the Egyptians learn from? Were these sons of Ham the first to develop to such a marvelous degree the arts of life? Did they find out by original observation what has been transmitted to us? And

through what remote antiquity were they slowly accumulating the experience which qualified them to establish such stable institutions, such settled traditions, such attainments in science and art?

No one can tell. At a point beyond our furthest traditions, her records show her to us rich, powerful, cultivated, skillful. Of the long ages before she was able to record her changes, time has long obliterated all traces. The world had long forgotten all about her, till the researches of the last half-century brought to light her long-buried life. Strange enough it is to be brought face to face with the monuments of a civilization compared to which all European history is but of yesterday—which was old in the days of Abraham—and to find there so much in common with our own.

A HUNDRED YEARS AGO.

One hundred and ten years ago there was not a single white man in what is now Kentucky, Ohio, Indiana, or Illinois. Then, what is now the most flourishing part of the United States was as little known as the heart of Africa itself.

It was not till 1766 that Boone left his home in North Carolina to become the first settler in Kentucky. And the first pioneers of Ohio did not settle till twenty years later still. A hundred years ago Canada belonged to France, and Washington was a modest Virginian Colonel, and the United States the most loyal part of the British Empire, and scarcely a speck on the political horizon indicated the struggle that in a score of years was to lay the foundation of the greatest Republic in the world.

A hundred years ago there were but four small newspapers in America; steam engines had not been imagined, and locomotives, and steamboats, and railroads, and telegraphs, and postal cards, and friction matches, and revolvers, and percussion caps, and breech-loading guns, and stoves and furnaces, and gas for dwellings, and India rubber shoes, and Spaulding's glue, and sewing machines, and anthracite coal, and photographs, and chromo paintings, and kerosene oil, and the safety lamp, and the compound blow-pipe, and free-schools, and spring-mattresses, and wood engravings, and Brussels carpet, and lever watches, and greenbacks, and cotton and woolen factories, in anything like the present meaning of these terms, were utterly unknown.

A hundred years ago the spinning-wheel was in almost every family, and clothing was spun and woven and made up in the household, and the printing press was a cumbrous machine worked by hand; and a nail, or a brick, or a knife, or a pair of shears or scissors, or a razor, or a woven pair of stockings, or an ax, or hoe, or shovel, or a lock, or a key, or a plate of glass of any size, was not made in what is now the United States. Even in 1790 there were only seventy-five postoffices in the country, and the whole extent of our post routes was less than 1,900 miles. Cheap postage was unheard of, and had any one suggested transmission of messages with lightning speed he would have been thought utterly insane. The microscope, on the one hand, and the telescope on the other, were in their infancy as instruments of science; and geology and chemistry were almost unknown. In a word, it is true that to the century passed have been allotted more improvements, in their bearing

on the comfort and happiness of mankind, than to any other which has elapsed since the creation of the world.

SAFES.

Fire proof safes are comparatively a modern invention. In 1707 the valuables and crown jewels of Scotland were deposited in an oaken chest. Its lid was secured by three locks. In 1818 the locks were forced open because the keys could not be found. Old cash and deed chests of this kind were elaborately carved and strengthened by iron bands. They were considered secure, as they were fastened by a number of bolts in a single lock or by several padlocks. During the last century, there were metallic safes consisting of iron frames covered with sheet-iron and hoop-iron crossed at right angles on the outside and riveted through to give it more strength. In 1801 there was a patent issued in England to Richard Scott. It consisted of an inner and outer casing of iron or other metal, between which was an interspace on all sides filled in with charcoal or wood, treated with a solution of alkaline salt. The next patent was granted to William Marr in 1834. He introduced a second metallic lining so as to form two interspaces within the safe, the inner of which was lined with mica and filled in with a non-conducting material. There was a variety of materials used at this time, such as clay, lime, graphite and asbestos. Since that time there have been an endless number of patents issued to inventors for burglar, fire, and water-proof safes, each claiming some new combination of materials whereby they will more effectually resist the attempts of burglars as well as the action of fire and water.

ANCIENT VESSELS.

Magnificent and large as are some of our modern steam vessels, they are inferior, if we may judge from the description, both in size and splendor, to the vessels constructed by the kings of Egypt and Syracuse, on a scale of grandeur corresponding to the immense preparations of their sculpture and architecture. Ptolemæus Philopater, King of Egypt, built a vessel 420 feet long, 56 feet broad, 72 feet high from the keel to the top of the prow, and 80 feet to the top of the poop. She had four helms of 60 feet; her largest oars were 56 feet long, with leaden handles, so as to work more easily by the rowers; she had two prows, two sterns, seven rostra or breaks, successfully rising and swelling out one over the other, the topmost one most prominent and stately; on the poop and prow she had figures of animals not less than 18 feet high; all the interior of the vessel was beautified with a delicate sort of painting of a waxen color. She had 4,000 rowers, 400 cabin boys or servants; marines to do duty on the decks, 2,820; with an immense store of arms and provisions. The same Prince built another ship, called the Thalamegus, or Bedchamber ship, which was only used as a pleasure yacht for sailing up and down the Nile. She was not so long or large as the preceding one, but more splendid in the chambers and their furnishings. Hiero, King of Syracuse, built an enormous vessel, which he intended for a corn-trader; her length is not given. She was built at Syracuse, by a Corinthian shipbuilder, and was launched by an apparatus devised by Archimedes. All her bolts and nails were of brass; she had twenty rows of oars; her apartments

were all paved with neat, square, variegated tiles, on which was painted all the story of Homer's Iliad.

She had a gymnasium, with shady walks, on her upper decks, garden plots stocked with various plants, and nourished with limpid water that flowed circulating round them in a canal of lead. She had here and there on deck, arbors mantled with ivy and vine branches, which flourished in full greenness, being supplied with the principle of growth from the leaden canal. She had one chamber particularly splendid, whose pavement was of agate and other precious stones, and whose panels, doors and roofs were of ivory and wood of the thya tree. She had a scholasterium, or library, with five couches, its roof arched into a polus or vault, with the stars embossed; she had a bath, with its accompaniments, all most magnificent; she had on each side of her deck ten stalls for horses, with fodder and furnishings for the grooms and riders; a fish-pond of lead, full of fish, whose waters could be let out or admitted at pleasure; she had two towers on the poop, two on the prow, and four in the middle, full of armed men, that managed the machines invented by Archimedes for throwing stones of three hundred pounds weight and arrows eighteen feet long to the distance of a furlong. She had three masts, and two antennæ or yards, that swung with hooks and masses of lead attached. She had round the whole circuit of her deck, a rampart of iron with iron screws, which took hold of ships and dragged them nearer, for the purpose of destroying them. The tunnels or bowls on her masts were of brass, with men in each.

She had twelve anchors and three masts. It was with difficulty they could find a tree large and strong enough for her highest mast. Great Britain—an ominous circumstance for the superiority of British oak!—had the glory of bestowing upon her a sufficient tree for that purpose. It was discovered among the recesses of Albion's forests by a swineherd! What is remarkable in the construction of this gigantic vessel, is that her sentina, or sink, though large and deep, was emptied by one man by means of a pump invented by Archimedes. Hiero, on finding that the Syracusan was too unwieldy to be admitted with safety into the harbors of Sicily, made a present of her to Ptolemy, who changed her name to the Alexandrian. Archemelus, the Greek epigrammatist, wrote a poem on the large vessel, which was rewarded by Hiero with a present to its talented author of one thousand measures of corn—a premium proportioned, if not to the poem, at least to the magnitude of the theme celebrated.

SCREWS.---TO MAKE THEM HOLD.

Screws may be made to hold in soft wood, or where the cut has become too large, by the use of glue. Prepare the glue thick, immerse a stick about half the size of the screw and put it into the hole, then immerse the screw and drive it home as quick as possible. When there is some article of furniture to be repaired, and no glue is to be had handily, insert the stick and fill the rest of the cavity with pulverized rosin, then heat the screw sufficient to melt the rosin as it is driven in. Chairs, tables, lounges, etc., are continually getting out of order in every house, and the time to repair them is when the break is first noticed. If neglected, the matter grows still worse, and finally results in the laying by of the article of furniture as worthless.

AMERICAN WONDERS.

The greatest cataract is the Falls of Niagara, where the water from the great Upper Lakes forms a river of three-quarters of a mile in width, and then, being suddenly contracted, plunges over the rocks in two columns, to the depth of one hundred and seventy feet each.

The greatest cave in the world is the Mammoth Cave, in Kentucky, where any one can make a voyage on the waters of a subterranean river, and catch fish without eyes.

The greatest river in the world is the Mississippi, four thousand one hundred miles long.

The largest valley in the world is the Valley of the Mississippi. It contains five hundred thousand square miles, and is one of the most fertile and profitable regions on the globe.

The largest lake in the world is Lake Superior, which truly is an inland sea, being four hundred and thirty miles long, and one thousand feet deep.

The longest railroad in the world is the Pacific Railroad, over three thousand miles in length.

The greatest natural bridge in the world is the Natural Bridge over Cedar Creek, in Virginia. It extends across a chasm eighty feet in width and two hundred and fifty feet in depth, at the bottom of which the creek flows.

The greatest mass of solid iron in the world is the great Iron Mountain in Missouri. It is three hundred and fifty feet high, and two miles in circuit.

The largest deposits of anthracite coal in the world, are in Pennsylvania, the mines of which supply the market with millions of tons annually, and appear to be inexhaustible.

ODD MINUTES OF WAITING.

While you are arranging the parlor, just have a thought for the visitors who must sometimes wait to see you, and carefully refrain from putting every object of interest beyond their reach. Of course, as a careful hostess, you never mean to keep callers waiting; but if they come when the baby is on the eve of dropping to sleep, or you are in the midst of planning dinner with the cook, you must delay a little, while they are reduced to staring out of the window, or to any involuntary effort to penetrate some insignificant household secret. The family photograph album is usually regarded as a sufficient resource in moments like these; but is there not something akin to indelicacy in allowing strangers and ordinary acquaintances to turn over the likenesses of our nearest and dearest—perhaps to criticise them with the freedom of unfamiliarity, or the unsympathy natural to lack of personal appreciation. The late magazines, a volume of poetry, a stereoscope and views, photographs of foreign scenes, and a dozen other things, are all good aids to the occupation of stray minutes. Moreover, they often suggest to the visitor and the host topics of conversation more profitable and interesting than the state of the weather or the history of the kitchen.

THE LION'S FEAR OF MAN.

Lichenstein says that African hunters avail themselves of the circumstance that the lion does not spring upon his prey till he has measured the ground, and has reached the distance of ten or twelve paces, where he lies crouching upon the ground, gathering

himself for the effort. The hunters, he says, make it a rule never to fire upon the lion till he lies down at this short distance, so that they can aim directly at the head with the most perfect certainty. He adds that if a person has the misfortune to meet a lion, his only hope of safety is to stand perfectly still, even though the animal crouches to make a spring — that spring will not be hazarded if the man has only nerve enough to remain motionless as a statue, and look steadily at the lion. The animal hesitates, rises slowly, retreats some steps, looking earnestly about him, lies down, again retreats, till having thus by degrees got quite out of what he seems to feel as the magic circle of man's influence, he takes flight in the utmost haste.

SILK IN ENGLAND.

There was, as we glean from chroniclers, a company of silk women in London as early as 1355; but these would appear to have been employed in works executed by the needle, either by sewing on some other material, or by knitting. Such goods being those which are now called small wares, were secured against the importation of certain foreign articles for five years. In 1453, this protection was further extended to other articles, such as "laces, ribands, and fringes of silk, silk embroidery, tires of silk, purses, and girdles." In 1482, this act expired, and as the makers of silk goods were speedily thrown out of employment, four years more were given them.

Twenty-two years later, certain goods were still restricted, whilst all raw materials were left free, together with such goods as the English did not know how to manufacture; for it was not until the latter end of the reign of James I. that the manufacture of broad silks had a fair start, and then, in 1689, the silk-throwsters of London were incorporated under the style and title of masters, wardens, assistants, and commonalty of silk-throwsters.

War and religious persecution, as carried on by our continental neighbors, really laid the foundation of the silk trade in England, and subsequently tended to support and develop it. The Duke of Parma, having taken Antwerp, in 1585, exercised his right as conqueror and governor of the Spanish Netherlands, to give up that city to three days' plunder and destruction. The result was that all fled who could do so, many with nothing for the future but their skill in manufactures. It is stated that a third part of the merchants and workmen engaged in the silk trade fled to England, and there finally settled, while the commerce of the Low Countries, and the manufactures of Flanders and Brabant became almost extinct.

The manufacture of broad silks and the rich tissues may date from this period, since it had now gained a footing, in a practical sense, and soon obtained the occasional patronage of royalty, and the still more stringent support of Protection Acts of Parliament — two modes of progressing trade, to which there is still a strong hereditary leaning to this day existent in Spitalfields. Even at this early period, when the trade could scarcely have got a more firm and extended footing in France than it had in this country, except that the French had already solved the problem of growing their own silk, complaints were made of the fashion tending to the encour-

agement of the foreigner; for it was stated, as matter of grave moment, that "women's hats were trimmed with hoods made of French silk, whereby every maid-servant became a standing revenue to the French King, of one-half her wages." Perhaps the silk hoods, of this and subsequent modern periods, were the origin of the modern lady's bonnet.

HASHEESH AND ITS SMOKERS AND EATERS.

The drowsy appearance and indolent character of Eastern nations is not only due to the climate of the countries, and the almost spontaneous production by the earth of everything necessary for the life of man, thus in a great measure rendering labor unnecessary, but it is aided and increased by the use of powerful narcotic drugs.

The Chinese have their opium which they chew and smoke to great excess, as it produces a delicious dreamy sensation that is relished by the many inhabitants of that most conservative country. We have often seen the celestial cigar-sellers in this city looking with a bewildered stare at the passing crowds, as if the noise of our bustling traffic was interfering with the sensations they sought to obtain from the opium they were smoking through bits of reed. The Ottomans—that is the nations inhabiting the north of Africa, the southwest of Asia and a portion of Europe—prefer the intoxication produced by hasheesh, which is a preparation of the Indian hemp, and which they smoke under the names of kiff, hasheesh or tekhomi.

The leaves of this plant are sometimes fried in honey and butter to extract the active resinous portion, and this they eat, as we should gum drops. The first smokers and eaters of hasheesh were called hasheeshins, from which our word "assassin" is derived, and the custom was first practiced in the days of the Crusaders by a powerful enemy of theirs, "The Old Man of the Mountain," as he was called, and who obtained the most implicit obedience from many followers by supplying them with this drug.

Its effect on the system is remarkable, and unlike that of opium, tobacco or alcohol. It immediately acts on the brain and nervous system, but does not stimulate the *creative* faculty, as does opium, and does not produce insensibility like alcohol, but while it allows its victim to be sensible to what is passing around, it intensifies sensations, and enlarges and expands to a most miraculous degree the objects by which the person under its influence is surrounded. Thus a few yards seems the stretch of a desert, and a tree is magnified into a forest, then come short and pleasant dreams—the world ideal mingled with the world actual. Persons who are in the habit of using this drug usually terminate their existence as lunatics; and since the French have had Algeria, their insane hospitals have been filled with the victims of hasheesh.

IMITATION OF MARBLE.

Imitations of marble are in great demand for ornamentation, and many different compounds are used for the purpose. Mr. Pichler, a gilder in Vienna, from his own experience, recommends the following composition as being simple and satisfactory:

Into one pound of best joiner's glue, boiled rather thick, half a pound of rosin (colophonium) is to be slowly stirred. (Instead of the rosin the

same quantity of Venetian turpentine may be used.) Into this plastic mass is worked a mixture of powdered chalk, and of any mineral color of the desired shade, and after the addition of a little olive oil it is ready for moulding. It is sometimes convenient to have the material in the shape of thin sheets to be cut as required, and in this case the mass is rolled out upon a slightly heated plate. Mr. Pichler asserts that this composition hardens rapidly and can be easily polished. When kept for a length of time it should be wrapped in a moist sheet, and exposed to gentle heat before using. The variegated marble-like veins can also be produced by kneading together differently colored portions of this mass.

A MODEL OF BREVITY.

Secretary Seward's will, which was written by his own hand at Pekin, China, November 5, 1870, is a model of clearness and brevity, reading as follows:

In the name of God, Amen.

I, William H. Seward, of Auburn, do make, ordain, publish, and declare this my last will and testament, hereby revoking all former wills by me made.

First—I devise, grant and bequeath in fee simple in equal shares to my three sons, Augustus, Frederick and William, the house and real estate in Auburn in which I dwell.

Second—I give, grant, devise and bequeath in fee simple absolute, all my remaining estate real and personal, in equal shares, to my said three sons and my adopted daughter, Olive F. Risley, daughter of my old friend, Harrison A. Risley.

Third—I appoint my son, William H. Seward, and my adopted daughter, the said Olive, executor and executrix.

[L. S.] WILLIAM H. SEWARD.

WILD PLANTS DOMESTICATED.

The cabbage is first cousin to cauliflower, broccoli, etc., and they all come from the wild cabbage of the sea-coast. It is a marine plant, and loves salt and salt water. The wild cabbage is a tall, wavy, coarse plant, but the pods are now gathered and eaten in the Spring months in some parts of England. There is no plant which has produced by cultivation a greater number of varieties than the cabbage. We can extend the varieties much further, but it is sufficient for us to consider the wild range between the little red cabbage for pickling, and the "mammoth," with a head so large that it can only be boiled in a large caldron. In the cauliflower we eat the fleshy flower stalks and undeveloped buds, which are crowded together in a compact mass. It was a favorite saying of the great lexicographer, Dr. Johnson: "Of all the flowers of the garden, I like the cauliflower the best;" a sentiment worthy of this learned epicure. The numerous varieties of the cabbage illustrate in the most striking manner the changes which are produced in species by cultivation, and the permanence of some varieties of races. They also give us instructive lessons in the economy of vegetable life.

The turnip comes from the wild plant found by the sides of the rivers, ditches and marshes. Like the cabbage, it has produced several varieties, the result of long cultivation. From the wild plant we have the little flat turnip and the huge *ruta baga*, with all the varieties between. This root is now most widely cultivated as food for stock, and it has added much to the wealth of England.

The parsnip is also a reclaimed wild

plant, and it is difficult to say whether we are indebted to cultivation or importation for it; most probably the latter, as it is a native of Britain. If the wild plant is cultivated two or three years in rich garden soil, it acquires all the desirable characteristics of the best kinds; and if left to itself in poor soil, it speedily goes back into its wild, degenerate condition. Parsnips appear to have been very early reclaimed from a wild state, for Pliny tells us that parsnips were cultivated on the banks of the Rhine, and were brought from them to supply the tables of the Roman Emperors.

INVENTION OF THE TELESCOPE.

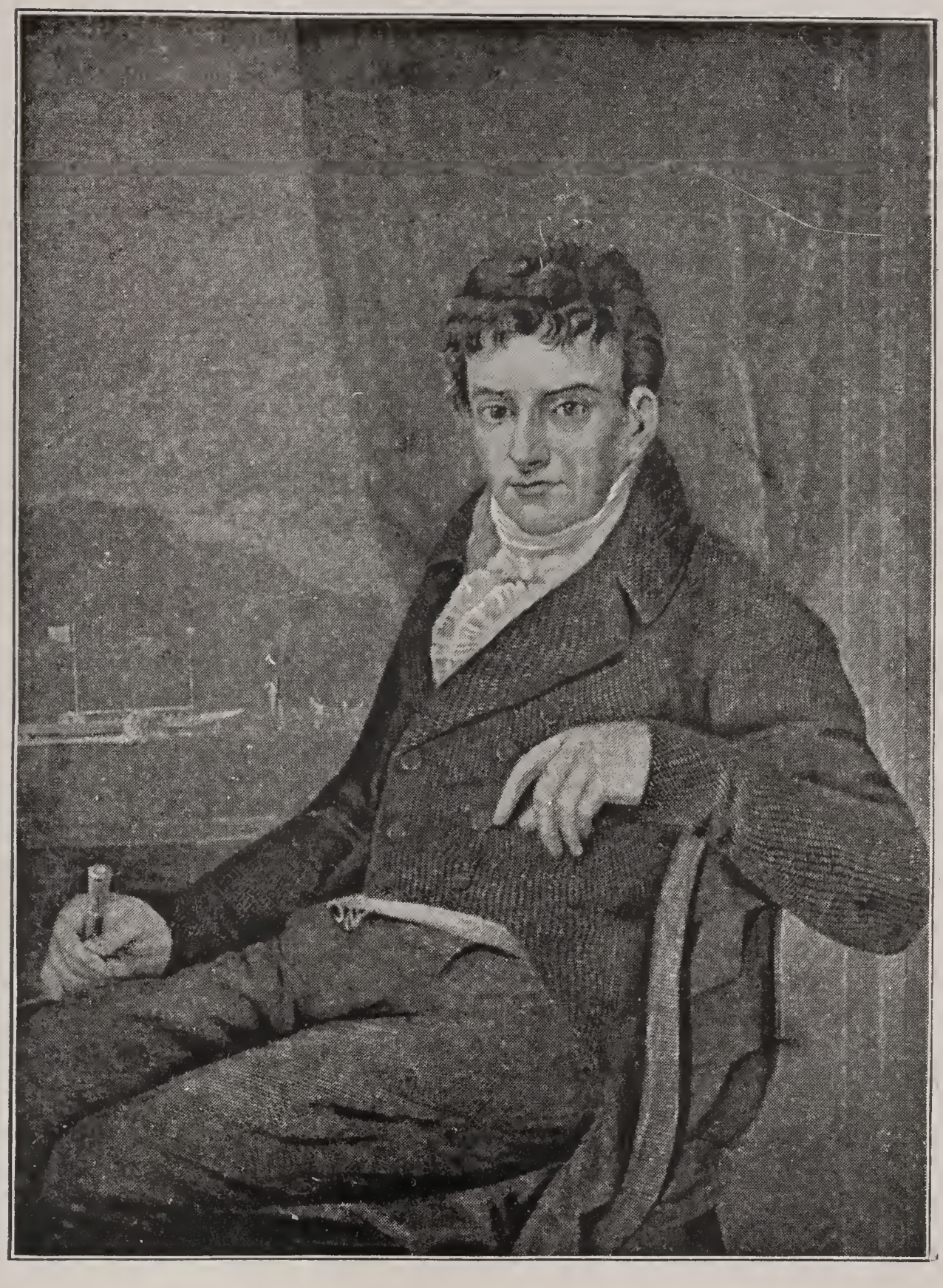
Testimony as to the discovery of this instrument is somewhat conflicting. The general opinion appears to be, however, that the invention is due to Jansen, a spectacle-maker of Middleburg, in Holland, about 1590. The discovery is said to have been made in the following curious manner: The children of Jansen, while playing in his shop, casually placed a concave and a convex glass in such a position that, by looking through them at the weathercock, it appeared much larger and nearer than usual. Their exclamations of surprise excited the attention of their father, who profited by the discovery, and soon obtained great credit for it. The celebrated Galileo, having in 1609, heard of this new optical instrument, made several improvements in it, and first employed it for astronomical observations. Sir Isaac Newton effected still further improvements, in 1663, and Dr. Hooke, Herschel, and the Earl of Rosse, have each contributed something towards the attainment of its present wonderful powers.

ARTIFICIAL IVORY.

By a simple process, artificial ivory is now produced from India rubber. Two pounds of pure rubber are dissolved in thirty-two pounds of chloroform, and the solution is then saturated with a current of ammonia gas. When the rubber has been completely bleached, the admission of the gas interrupted, the mass is transferred to a vessel provided with a stirrer, in which it is washed with hot water until the bleaching agent has been entirely removed. The remaining product forms a kind of froth, which, being pressed out, dried, and again treated with a small quantity of chloroform, is finally obtained as a consistent paste. This paste is now mixed with a sufficient quantity of finely pulverized phosphate of lime, or carbonate of zinc, until it assumes the appearance of moist flour. In this condition it is pressed in hot moulds, which it leaves sufficiently hard to be turned, planed, filed or bored. In order to imitate corals, pearls, enamels, hard woods, etc., it is only necessary to mix the paste with the desired colors previously to its being compressed.

BEAUTIFUL EXPERIMENT ON SOUND

The following beautiful experiment, described by Prof. Tyndall, shows how music may be transmitted by an ordinary wooden rod. In a room two floors beneath his lecture-room there was a piano, upon which an artist was playing, but the audience could not hear it. A rod of deal, with its lower end resting upon the sounding-board of the piano, extended upward through the two floors, its upper end being exposed before the lecture-table. But



R. Fulton.

still no sound was heard. A violin was then placed upon the end of the rod, which was thrown into resonance by the ascending thrills, and instantly the music of the piano was given out in the lecture-room. A guitar and a harp were substituted for the violin, and with the same result. The vibrations of the piano-strings were communicated to the sounding-board, they traversed the long rod, were reproduced by the resonant bodies above, the air was carved into waves, and the whole musical composition was delivered to the listening audience.

ROBERT FULTON.

Every American will be glad to know something of the life of this distinguished man, who first overcame the wind and the waves, and is immortal as the father of steam navigation.

He was born in Little Britain (now called Fulton), in Pennsylvania, in the year 1765. His father died while Robert was a mere child, and the lad was left to pick up knowledge and education the best way he could. He was known as a "notional" boy,—full of mechanical ingenuity; and spent most of his time gratifying his curious eye and mind among the workshops of the place. He made many little wooden machines. He also showed a talent for drawing, and made many political caricatures of the boys who quarreled in the streets. At the early age of seventeen, he commenced life in earnest as a painter. But his mechanical genius never slept, and through his lifetime brought him many honors.

While he was still young his lungs became affected, and he visited England in search of health. Here he became the friend of that great painter, Benjamin West; and studied his art with constant industry and enthusiasm. During this tour, he became acquainted with the Earl of Bridgewater, the father of the English canal system; and through his influence, and that of Lord Stanhope, Fulton was persuaded to abandon painting, and give his attention to civil engineering. He established a residence at Birmingham, and became the companion of James Watt, the inventor of the steam engine. He here gave much attention to canal engineering, and patented a method of measuring inequalities of height. He also patented machines for sawing marble, for spinning flax, for making rope, and for digging canals. At this time, he urged upon the State of Pennsylvania, through Governor Mifflin, the introduction of a line of canals in that State.

In 1797, he went to France, to bring to the notice of that government a marine torpedo of his invention. He lived for a long time in Paris, and acquired the French, German and Italian languages. In 1801, Chancellor Livingston, who had been for some time engaged in steam experiments on the Hudson river, went to Paris, and met Fulton, who immediately joined him in a series of experiments, which, after two years' labor, resulted in a machine, invented by Fulton, for moving a boat by steam. It was made by Watt and Bolton, of Birmingham, England, and sent to New York in 1806. Fulton immediately followed it, and went to work to build a steamboat. To raise funds therefor, he offered to sell one-third of his patent; but nobody had faith enough in the undertaking to buy it. Finally, he finished the boat —the "Clermont"— which made its first trip September 14, 1807, traveling from New York to Albany, one hundred and fifty miles, in thirty-two

hours. The boat then commenced regular trips between the two cities, but was soon too small for the travel, and was succeeded by several improved and more commodious vessels.

In 1808, Fulton was married to Miss Harriet Livingston, the niece of the Chancellor, his partner. All his future life was engaged in constant scientific work, with special reference to water navigation. He died on the 24th day of February, 1815.

WHEAT, BARLEY, OATS, ETC.

Wheat was cultivated in this country at a very early date, having been sown by Gosnold on the Elizabeth Islands on the southern coast of Massachusetts, as early as 1602, at the time he first explored that coast. In 1611 it was cultivated in Virginia, but the settlers soon found that the cultivation of tobacco would pay better, and for nearly a hundred years there was comparatively little raised. Premiums were offered to encourage its culture, but were not sufficient to check the growing attention to tobacco. Wheat had been cultivated by the Dutch Colony of the New Netherlands, and samples of this grain were taken to Holland, in 1826, to show what could be done in the new country.

Indian Corn. — This plant is of American origin. It was found in cultivation among the aborigines of the country at the time of its discovery by Columbus. It is referred to by the oldest historians of Peru. It has been found growing wild in various parts of Central America; and Humboldt says: "It is no longer doubted among botanists that *maize*, or Turkish corn, is a true American grain and that the old continent received it from the new."

Rye was introduced and cultivated in all the colonies at the earliest period of their settlement, and its meal was mixed with Indian meal for the making of bread in New England as early as 1648, and perhaps even as early as 1630, and that custom became very common.

Barley and Oats were sown on the first settlement of the colonies, having been first cultivated by Gosnold in 1602, at the same time and place where he cultivated the wheat.

Buckwheat was introduced into the colony at Manhattan Island by the Dutch West India Company, and raised there as early as 1625. Its culture was continued by the Dutch to some extent, and they used it as provender for horses. It was also cultivated by the Swedes, who settled along the Delaware, in New Jersey and Pennsylvania.

Timothy. — The cultivation of timothy, the most important of the grasses, was not introduced until about 1740, having been found by a man named Herd, in a swamp near Piscataqua. He propagated it till it was taken to Maryland and Virginia by Timothy Hanson, after whom it is most frequently called.

THE ORIGIN OF CAMP-MEETINGS.

Many statements have been made concerning the author and origin of camp-meetings. One writer has located the first meeting in a certain place, and another in a different region, and, as different localities have been claimed, so have the agencies and circumstances, also, varied.

The following brief history of these meetings have been carefully obtained from authentic records, and is believed to be correct:

The author of camp-meetings, Rev.

James McGready, was of Scotch-Irish descent, and was born in Pennsylvania. When quite young, his parents moved to North Carolina, and, at an early age, young McGready united with the Presbyterian Church. In the fall of 1785, he was sent to Pennsylvania to be educated, and first entered a school conducted by Rev. Joseph Smith, at Upper Buffalo, and designed for the education of young men preparing for the ministry. After remaining here for some time, he entered a school more recently opened by Rev. John McMillan, D. D., which grew into what has long been known and honored as Jefferson College.

Mr. McGready was licensed to preach by the Presbytery of Redstone, August 13th, 1788. After devoting some time to the work of the ministry, he came to the conclusion that he had no experimental knowledge of Christ. In this particular, he resembled Rev. John Wesley, of whom it is said, in the *Encyclopedia Americana,* that he preached some years before his conversion. Mr. McGready found peace in believing, on Sabbath morning at a sacramental meeting, near the Monongahela river; and soon after that he returned to North Carolina. His earnest and pointed discourses caused much opposition from careless professors and unbelievers. Some of the baser sort went to his church, broke down the seats, burnt the pulpit, and left a letter written to him in blood, requiring him to leave the country at the peril of his life. On the following Sabbath morning, he stood in the door of his church and preached a sermon of great power, and full of warning.

In 1796, Mr. McGready went to Kentucky and took the pastoral charge of three congregations — Jasper River, Red River and Muddy River.

He had the members of his new charge to sign a covenant to spend one-half hour every Saturday evening, beginning at the setting of the sun, and one-half hour every Sabbath morning, from the rising of the sun, pleading with God to revive his work.

During the following year a religious interest was realized, commencing at Jasper River meeting-house. In 1799 it became more extended, and he was assisted by other ministers of piety and energy.

In 1800 a revival prevailed throughout a vast region of the country, and, hence, it is called the "Revival of 1800."

The ministers who labored in this great work were James McGready, William McGee, Samuel McAdow, and John Rankin, of the Presbyterian Church, and John McGee, of the Methodist E. Church. The first camp-meeting ever known in Christendom was held in July, 1800, at Jasper River, Logan county, Ky.; the circumstances of which are as follows: A family who had just arrived in the country, from one of the Carolinas, were desirous of attending one of Mr. McGready's meetings, but were about to decline going, because the meeting was some distance from them, and they had no acquaintances in the country. A female member of the family suggested that they had camped with their wagon on their journey from Carolina to the country, and they might still camp long enough to attend the meeting.

They accordingly took their wagon and provisions, and camped near the church and attended the meeting. At the next meeting in his charge, several other families followed their example. This was a good omen, and suggested to Mr. McGready the idea of a camp-meeting, and he accordingly appointed

a meeting at Jasper River, and announced that the people would be expected to camp on the ground. For shelter, they used their wagon covers and cloth tents. The first camp-meeting was held from Friday until the next Tuesday, and resulted in forty-five conversions. The ministers who occupied the stand on that occasion were James McGready, William McGee, and William Hodge. A vast concourse of people came to the meeting, from the distance of twenty, fifty, and even a hundred miles.

Camp-meetings are now held by various denominations throughout the United States, and in Europe.

GEORGE STEPHENSON.

The credit of the invention of railways is claimed by the friends of many men. It will never be known who first conceived the idea of land locomotion without animal power. But all the argument and bickering in the world cannot rob George Stephenson of the glory of bringing that idea into practical use, and thus working an entire revolution in the commerce of the world. To his clear head and dogged perseverance, we are indebted for the practical success of a system which, next to the telegraph, has done more than anything else to promote the wealth and progress of the world.

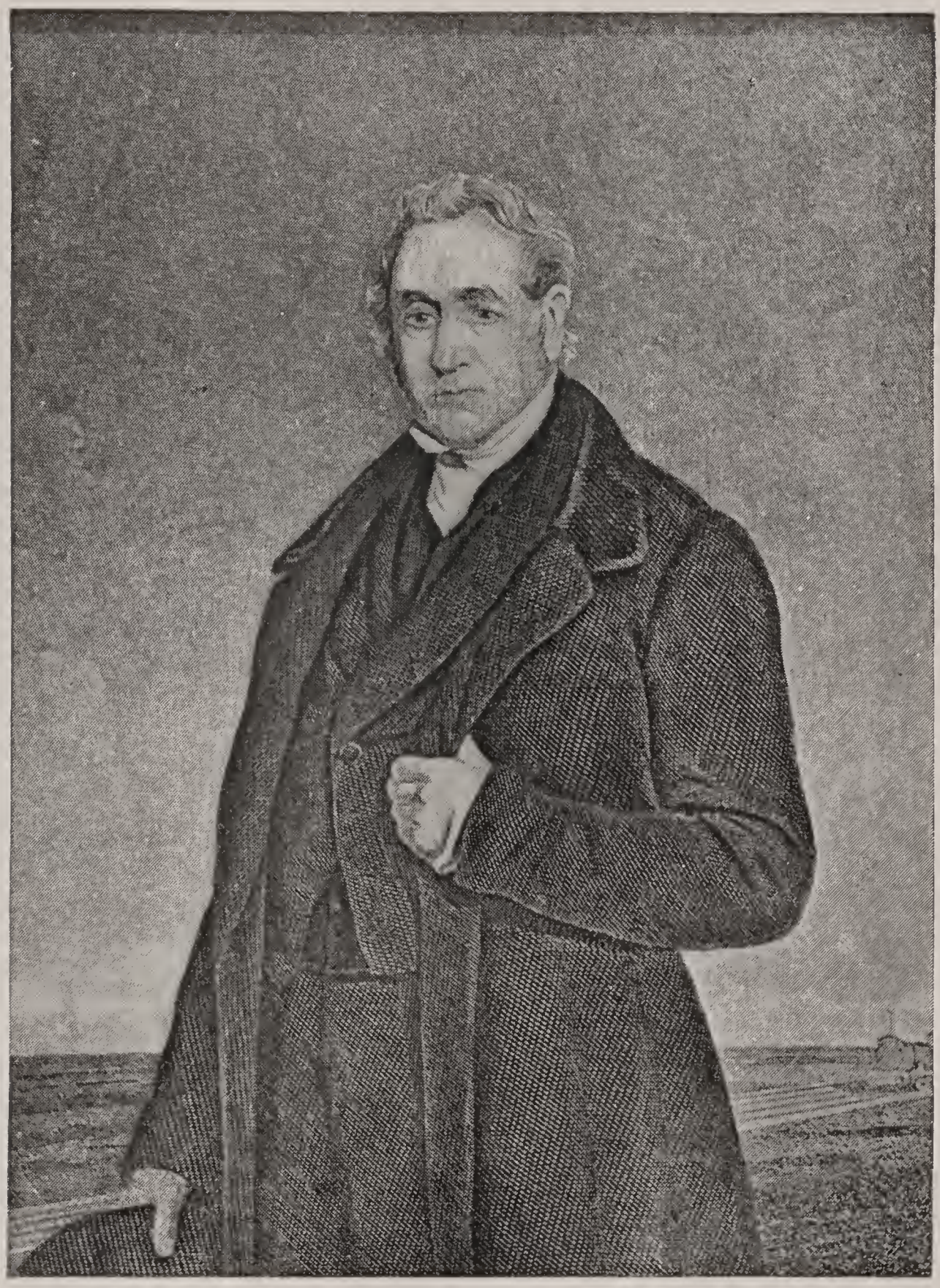
He was born at Wylan, near Newcastle-on-Tyne, June 9th, 1781. His parents were exceedingly poor, but industrious and respectable. His father was fireman of the stationary engine which performed the pumping work of the village coal-mine — and near his house was the wooden tramway on which the coal-cars were drawn by horses. At eight years of age he killed the time of his employment of watching cows, by making little stationary engines out of mud and sticks. At fourteen, his wildest youthful ambition was realized by his appointment as assistant fireman on his father's engine. His leisure time, thereafter, was passed in studying the machinery and principles of his engine, of which he soon became a perfect master. At seventeen, he had charge of the engine at the Water-Row coal pit, the property of the Duke of Newcastle.

All this time, he had no educational advantages. But at seventeen, he seized the opportunity of attending a night-school, to study reading, writing and figures, — the latter of which was his particular delight. At nineteen, he was proud to be able to write his name.

At twenty, he fell in love with Fanny Henderson. But, before he could marry, he must fix the door against the wolf. So, while he attended to his engine, he mended shoes for the neighbors,—thus managing to lay up a little marriage money,—and soon had his wife. Shortly after, bad fortune came upon him in many ways, but he worried it through.

As soon as his boy Robert was big enough to go to school, Stephenson sent him there, and worked nights, mending clocks and watches for money to keep the lad at his books. In after years, that boy was his best friend and greatest help.

While the boy was at school, somebody made a new engine for the Killingworth colliery, but it wouldn't work. All the engineers in the country tried to fix it, without avail. Then George went at it, while the others laughed at him; and, in four days the engine was all right. A short time after, he was "engine doctor" for the whole country.



Geo. Stephenson.

Long before he was born, other people had tried to make locomotive engines to run on tramways and common roads, but without success. So Stephenson went to work at it—for, when everybody else failed in mechanics, he was always bound to see what he could do. He made an engine, and, on the 25th day of July, 1814, it drew thirty tons of freight, four miles an hour. And that 25th day of July was the birthday of railroads. From this time he labored incessantly to perfect his system, and made several improvements in the machinery and the rails. In November, 1822, he commenced operating another coal railway, from Hetton colliery to the river Wier, a distance of eight miles, using five locomotives of his own make. They traveled four miles an hour, with a load of sixty-four tons. The first public railway ever built, the Stockton and Darlington, was opened September 27th, 1825, and Stephenson drove the first engine on it. From this time his success was assured; and all his after life was spent in constant labor for the improvement and advancement of his pet design. He died on the 12th of August, 1848, at the age of sixty-seven years.

BEAUTIFUL EXPERIMENT WITH LIGHT.

Choose a room where the sun shines in through the window, and then block out all the light, by means of a shutter or otherwise, taking care that all cracks are stopped. Then cut a hole about six inches square in the shutter, and stop the hole with two or three thicknesses of rich deep blue or blueish-purple glass. A broad beam of deep blue or purple light from the sun will thus stream down into the otherwise dark room. Then hold in the deep blue light a bottle or other article made of uranium glass. Ornamental bottles made of this glass, which is sometimes called "canary" glass because of its light yellow color, are commonly on sale in chemists' shops. They are plentifully made to hold smelling salts, and may cost from sixpence to three shillings each. The blue light should be deep and not very brilliant. When the uranium glass bottle is held in it, the bottle will appear to glow with great beauty, with all the brilliancy of a glow worm, as if white hot.—

ROSES.

The Persians, compared with their neighbors, the Turks and Egyptians, are a lively people, but we would call them quiet, and even sad, because their gayety is so different from ours and their manners are more grave and dignified. But they are fond of amusements, and one of their yearly festivals is the "Feast of the Roses," which takes place during the rose season, which is June, July, and, indeed, the greater part of the summer.

The climate being very warm, the people live much out of doors, and during this feast tents are pitched; every one wears his or her prettiest dresses, and, as all Eastern people are fond of bright colors, the scene is a very gay one.

During this festival everything betokens mirth and enjoyment. The cymbals and lute are heard from morning till night, the story-tellers recount their most beautiful tales, and the dancing girls dance for hours at a time. Then when the night comes, and the moonlight covers everything like a silver cloud, the people stretch them-

selves on their soft carpets, and listen to the songs of the nightingales and soft serenades on the women's lutes.

In some parts of Turkey whole fields of roses are cultivated, from which the Turks make the famous "altar of roses," which is so fragrant that a vessel, or anything touched with a drop of it, seems never to lose the smell; and the Hindoos scatter rose leaves in the water they drink, to give it a pleasant appearance.

There are more than two hundred kinds of roses, and they are of all sizes, from the tiny "Picayune rose," so called because it is no larger than a five-cent piece—which in the South is called a picayune—to the immense cabbage rose; of all shades of color, bright yellow, pink, red and almost black. The rose of Damascus, or damask rose, is the first one brought to this country, a very deep red, with a strong perfume. Then there are the Egyptian Sea roses, tea roses, rock roses, which grow in dry, rocky places, where no other flower can live; and the Alpine rose, growing by the eternal snow drifts of the Alps.

Roses are hardy plants, and will live a long time if properly cared for. There is a rose tree in Germany which is known to be eight hundred years old, and is still blossoming.

We all know and love the pretty moss rose, with its mossy, green veil, that gives it such a shy, modest air; and the tea rose, which in the South and West, grows on large trees.

But there is one rose more curious than all others—the Rose of Jericho. It has another name by which botanists call it, that is, *Anastatica*, a Greek word meaning resurrection, and the Arabs call it the symbol of immortality, because it comes to life again long after it has seemed to be dead. It lives in the hot sands of the deserts of Sahara, and when the dry season comes, it withers, folds its leaves and draws up its roots, like little feet, into a light ball, and the winds of the desert carry it until it reaches a moist soil, and then, we are told, it drops, takes root, and its leaves become green, and its blossoms open, a delicate pink.

There is a flower in Mexico, known as the resurrection flower, which is very much the same. It may be carried about in your pocket for a year or more, and yet, when put in a saucer of water, in a few hours will blossom out as bright and fresh as if it had just come out of the garden.

When the Romans conquered Britain, more than 1,800 years ago, they introduced many curious customs into that country—among others that of carving the figure of a rose on the ceilings of their banqueting halls, or suspending a natural rose over the dining table, with the Latin motto, "sub rosa," written above it, to indicate that whatever was said there among friends, or under the rose, for that was the meaning of the words, should not be repeated, the white rose being the symbol of silence.

The rose is the national emblem of England, as the thistle is of Scotland, and the shamrock, or clover, of Ireland. Every one who has studied history, knows of the War of Roses in England, when the two rival families of York and Lancaster fought for the English crown, the House of York having for its badge the white rose, and the House of Lancaster the red.

Many readers have heard of the language of flowers, in which people can hold conversation with each other; for instance: a white rose is the emblem of silence; a withered rose of any color, "Let us forget;" and a

yellow rose, "Despair," and so on. A rose handed to a person means one thing when handed upright; another when its position is reversed. With its thorns it has a certain meaning; without them still another. Among these Eastern people — Persians, Turks and Hindoos — this language of flowers is so perfectly understood that by means of a bundle of their favorite roses, long conversations may be carried on without a word being spoken. This suits these people, who do not like to talk very much, but who are, nevertheless, a very romantic, dreamy and poetic race.

APPLES — FIRST IN THIS COUNTRY.

The first apples raised in this country were from trees planted on Governor's Island, in the harbor of Boston, from which, on the 10th of October, 1639, "ten fair pippins were brought," there being not one apple or pear tree planted in any part of the country but upon this island. Governor Endicott had, on his farm in Salem, now in Danvers, in 1640, the first nursery of young fruit-trees that was ever planted in this country, and it is related that he sold five hundred apple trees for two hundred and fifty acres of land.

The cultivation of fruit was rare in the early history of the country. At the close of the Revolution, and, in fact, at the end of the last century, it would have been impossible to have found in the whole country the number and varieties of good fruits which might now be found in a single orchard. Apples were apples, and all apples were fit to make cider, and that was enough. It was regarded as absurd for any but a young man to set out trees; and, when a man of seventy began to plant an orchard, the idea was so ludicrous as to subject him to the ridicule of the whole neighborhood. The oldest horticultural society in the United States was founded in 1829

THE FIRST HORSES IN AMERICA.

The culture of the horse has become an art in America. In the old time, before the days of railways, or steamboats, or turnpikes — when the wretched country roads were mere clearings in the forests and patchings on the hillsides — the horse was so much needed for purposes of travel and transportation that little opportunity was offered for developing the better traits of his character which make him the noble, useful, and fashionable animal that he now is. To this culture the farmer of to-day is indebted for his sturdiest teams, and the wealthy man for one of the greatest comforts of his business or leisure.

The first horses known in America were brought here by Columbus, in his second voyage, A. D., 1493. The first in the United States were brought to Florida, in 1527, by Cabeca de Vaca. He brought forty-two, but they soon died; the "flowery meadows" did not suit their temperament. In 1604, M. L'Escarbot, a French lawyer, brought several horses to Acadia. From this stock sprung the famous Canada ponies, which, owing to the bitter climate in which they live, do not represent the size of their Norman ancestors, but are still the knottiest, naughtiest, hardiest little creatures of their kind in the world.

In 1609 six mares and one horse were taken to Jamestown, Virginia; and in 1657 the exportation of their descendants was prohibited. Higginson brought the first horses to Massa-

chusetts, in 1629. These were of English blood, from Leicestershire. New York horses date from 1625, having been imported by the Dutch West India Company, and selected from the Flemish race.

These different families of the valuable animals were subsequently cultivated by careful inter-breeding with horses which the warmer climate of the middle and southern States had made more delicate. These are the fathers and mothers of our present race-horses. The hardy ponies of Canada married with their gentler cousins of Massachusetts and Vermont, from whence sprung the race of famous trotters, the Hambletonians, the Morgans, and others. They are especially valuable as roadsters. In speed and power of endurance they excel all other horses in the world.

The wild horses of the plains (the "mustangs") are supposed to have descended from the splendid Spanish horses lost and abandoned in the Mississippi Valley by DeSoto, during the disastrous part of his exploring expedition.

AMERICAN CATTLE.

These glorious beasts, who bear so large a share of our national trade and comfort, are not of American origin. They came from Great Britain, having been first brought to this country about the year 1609, by the sturdy Englishmen who settled Virginia. From there they kept pace with the spread of civilization, plowing our fields, transporting our produce, and furnishing beef for the old folks and milk for the babies, all over the land. In 1610, several cows were imported; and in 1611 over one hundred kine were added to the rich pasture herds of the Old Dominion. Shortly after, some adventurous men imported several cattle from the West Indies. These are supposed to be co-heirs in the glory of Columbus, having been descendants of those brought over by him in 1493. In the old Virginia times these animals were considered so valuable for general purposes besides their flesh, that killing them was forbidden by law, on pain of death. In 1620 there were five hundred head of cattle in Virginia. In 1639 there were thirty thousand. The New England stock was largely derived from these.

The first foreign cattle in New England were brought there in 1624, by Gov. Winslow. That enormous herd consisted of three heifers and one bull. They belonged to the Plymouth Colony, and were owned in common. In 1626, twelve cows were sent to Cape Ann,—in 1629, twenty more were imported; and in 1630, "Massachusetts Bay" had an invoice of one hundred more.

The first cattle in New York were brought from Holland. The Dutch West India Company brought over one hundred and three horses and cattle for breeding. Each tenant was "loaned" four cows and four horses —the progeny to be kept, and the old fellows to be returned. The Swedish West India Company introduced them in Delaware as early as 1627. In 1631, '32 and '33, Capt. John Mason brought several cattle to New Hampshire. The different tribes of cattle thus brought into the country were exchanged back and forth among the colonies, until the breeds became inextricably mixed, and the common cattle of the United States is the consequence.

In early times, the cattle were fed in winter merely on corn husks and wheat straw, and the cows were not milked during that season, on account of a superstitious belief that milking would kill them. Still, they increased rapidly, and before the commencement of the eighteenth century they were plenty, even in the Mississippi Valley and up the Louisiana Red River country. In 1750 one Rhode Island farmer had one hundred cows. Another sold thirteen thousand pounds of cheese in twelve months, and another made ten thousand pounds of butter in five months, from seventy-three cows.

In 1868 there were 21,433,099 cattle in the United States, over nine millions of which were milch cows, two millions working oxen, and ten millions kept for beef and other purposes. The money invested in slaughtered animals that year exceeded $318,000,000.

AMERICAN SWINE.

The introduction of hogs to America dates back to the year 1538, when Ferdinand de Soto brought them from Cuba to Florida. It is supposed that the Cuban race descended from the herd which Columbus brought over in 1493, in that ark of his which carried all sorts of animals, and made him the Noah as well as the Adam of the western world. In 1553, the Portugese (who are notoriously very fond of hoggishness) brought their favorite animals to Nova Scotia. It was a good climate for hogs,—so they grew and were multiplied. In 1609, the English brought them to Virginia. That was another good country for them. Their numbers increased so rapidly that in 1627 they had become a pest in the colony, although the Indians killed them by hundreds in the woods, and lived on wild pork.

In 1624, Governor Winslow brought them to Plymouth Rock; and the next year the Dutch West India Company made New York City happy with them. They increased so greatly as to attract attention and study, even in their wild state, and here men discovered that corn-fed pork was better than mast-fed.

All these hogs were common, or coarsely bred. The first fine-bred hogs in the country were a present from the Duke of Bedford to George Washington. But he never saw them, for the man who brought them over the ocean sold them to somebody else, and pocketed the money. Their progeny were soon well known in Maryland, Delaware and Virginia.

For a long time, the hogs in the eastern and middle States were long-legged, slab-sided, with sharp noses. This race was much improved by crossing with another, imported by Chancellor Livingston, of New York, about the time of the introduction to our pastures of Merino sheep — and known (for that reason) as the "Merino hog." Since that time, a great many different breeds have been imported from Europe and Asia; and improvements made in the breeds until the American hogs compare favorably with any in the world.

THE INTRODUCTION OF SHEEP IN AMERICA.

As nearly as ascertained, the first sheep brought to America came to Virginia in 1609. They were from English flocks. In 1648 there were

three thousand sheep in that colony. In 1625, the Dutch West India Company imported a large herd of sheep from Holland to New York. This venture was not successful. There were too many of those amiable and highly necessary animals, dogs and wolves, in the country; and the fierce and unprofitable sheep had to suffer. In 1643, only sixteen remained in the colony.

The Pilgrims brought sheep to the "stern and rock-bound coast" of New England, about the year 1630. In 1633 there were several on the islands in Boston harbor. In 1635 they were domiciled in Portsmouth, New Hampshire. In 1660 they were brought to Nantucket Island, and wool-growing began to become one of the important industries of that section.

In those old days there were few large herds of sheep in the country. Each farmer kept a few coarse, ragged sheep for his own use, and made a few homespun garments. The first fine-wooled sheep were Merinos, brought from Spain to Boston, by William Foster, in 1793. This small beginning of the present fine-wooled flocks, consisted of two ewes and one ram. They came near dying on shipboard, but were saved by diligent care. Mr. Foster presented them to Mr. Andrew Cragie, of Cambridge, who, having no idea of their great value, quietly ate them. He afterward paid one thousand dollars, at an auction sale, for a ram.

It was not until 1810 that the importation of merino sheep became large. It was much favored by the effects of the embargo of 1808—fine wool being then worth one dollar and a half to two dollars a pound. In the two succeeding years over four thousand sheep were imported.

In 1850 there were nearly twenty-two million sheep in the United States. Most of these were in the southern and western States, the number in New England and the middle States having largely decreased. In 1870 the sheep population of this country had reached thirty-eight millions, the aggregate value of which was more than eighty-two million dollars. The wool crop of that year was over one hundred and five million pounds.

THE HISTORY OF THE BALLOON.

The inventors of the balloon were the brothers Stephen and Joseph Montgolfier, sons of a paper-manufacturer at a small town called Annonay, in France. The Montgolfier family were ardent Huguenots, and suffered a great deal after the massacre of St. Bartholomew. Both brothers were mathematicians and architects.

Annonay affords a fine view of the Alps. The two Montgolfiers had often watched the ascent of clouds along the sides of the mountain, and, being of a reflective cast of mind, they began to inquire into the causes of the equilibrium of those enormous masses of clouds sailing through the air. They found a theoretical solution; but, not satisfied with this, resolved to test their ability in copying nature. They thought of making artificial clouds, and of sending them to join those that hovered about the tops of the Alps. They enveloped the vapor of water in a light envelope. It rose for a moment; but the vapor condensing, it soon fell to the ground. They next tried to inclose the smoke produced by the combustion of wood in a linen envelope; but here they

met with no better success. They now came across Priestley's "Experiment on the Different Kinds of Air," in which the learned chemist acquainted the world with a great number of new gases and with their properties. Stephen, reflecting on Priestley's theories, came to the conclusion that it would be possible, by enclosing in a light envelope a gas lighter than air, to cause the whole to rise. He first tried hydrogen; but, the material of his envelope not being able to prevent its escape, his balloon soon returned. The brothers now lighted a fire, held paper bags over it, and found that, when well filled with the smoke or the heated air, the bag moved rapidly upward.

It was on the 5th of June, 1783, that the first public balloon ascension was effected, under the direction of the Montgolfier brothers. Their balloon was made of linen, and was 105 feet in circumference. It was heated from little piles of straw, and, when set free, rose to a considerable height, traveled ten minutes and then descended, about a mile and a half from the place of departure.

The ascension of Montgolfier's balloon created a general sensation wherever the news spread, and other ascensions followed in quick succession. Two brothers of the name of Robert decided to repeat the Montgolfier experiment. Hydrogen — at this time known as inflammable air — was used, instead of common heated air, to fill the balloon, which was made of silk, varnished with a species of gum, and was about thirteen feet in diameter. The inflation began on the 23d of August, 1783, and was not concluded until the 27th, when it was set free and rose to the height of about 3,000 feet. A vast assemblage of people gathered at the Champs de Mars and witnessed it ascend. The excitement created by the novel sight in the gay city of Paris was so intense that the crowd did not disperse, although, shortly after the balloon had made its ascent, a heavy shower of rain began to fall. The rain, however, did not check in any way the flight of the balloon. After remaining in the air a little less than an hour, it descended fifteen miles from the Champs de Mars. It met with a very inhospitable reception from the peasantry among whom it fell; for, believing it to be a messenger of Satan, they tore it into shreds.

About the middle of the following month Joseph Montgolfier sent up a balloon in the presence of the French royal family at Versailles. This time a cage, with a cock, a duck and a sheep for tenants, was attached to the bag. They were carried to a height of 1,500 feet and returned uninjured after a journey of two miles, performed in eight minutes, to the earth.

Francoise Philatre de Rozier was the first human being to navigate the air. After various experiments in a balloon attached to the ground with ropes he risked himself in a free one, and his first free ascent was successful. A short time after, other ascents were made by two other French gentlemen, Messrs. Charles and Robert. Charles reduced the balloon to pretty much the form it has at present. He introduced the netting, the valve and the car. After this balloon ascensions became a rather every-day affair.

The first American balloon ascension took place in 1783, and the first English one in the same year. Of the most noted balloon ascensions we have space to mention but a few. That of Lunardi, secretary to

the Ambassador from Naples to England, is remarkable more for the excitement its novelty produced in London than from any wonderful incidents connected with his ærial trip or any new discovery made by him. His balloon was thirty-three feet in diameter, and, when exhibited at the Lyceum, in the Strand, attracted vast numbers to see it. He made his ascension Sept. 15, 1784, from the artillery grounds in the presence of the Prince of Wales, and a vast concourse of people. He took a pigeon, a cat and a dog with him, and hoped to steer the balloon upward or downward by means of oars, a large number of which he took with him. The pigeon flew away, and he descended after he had been up an hour and a half, to deposit the cat, which was suffering from the cold, on *terra firma*. One of his oars broke and fell. A lady, supposing it to be the aeronant himself, was so much affected that she died. A jury sitting at a criminal trial acquitted a young man accused of felony, rather than run the risk of not witnessing the ascension. The King, in consultation with his Ministers, dissolved the meeting in order to enjoy the new sensation. Lunardi descended the second time at Standon, near Ware. He became the lion of the day and the center of attraction for a time, and was presented at court, all of which encouraged others to ascend from English soil, and the Italian soon found a great many Englishmen to emulate his daring. Among these was Blanchard, who, accompanied by an American physician, crossed the Channel in 1785. This is the first time it was crossed. Philatre de Rozier attempted to repeat Blanchard's feat on the 15th of June, 1785, leaving Boulogne for England. He used two balloons, or rather a double balloon, one a fire-balloon, ten feet in diameter, and the other a gas-balloon, thirty-seven feet in diameter. The fire-balloon was placed under the gas-balloon, and when the aeronaut wished to ascend or descend he increased or decreased the fire in the fire-balloon, and thus avoided a waste of gas. The ascent was successfully made; but after the balloons had been in the air about half an hour they were discovered to be in flames. Rozier and his companion, Romain, fell from a height of 3,000 feet, and both were killed — the former instantly, the latter surviving a few moments only. Others have frequently tried to cross the Channel. Crosbie, who was the first to ascend from Ireland, tried it in 1785, and fell into the sea, but was rescued by a passing vessel. Lunardi, already mentioned, also fell into the sea in a similar endeavor and was saved in like manner.

Nadar's balloon, constructed in Paris in 1863, had a capacity of 200,000 cubic feet of gas. There were two stories to the car. He made two ascents in the "Giant," the first time carrying thirteen persons and the second nine. The first trip was a very short one. The second lasted seventeen hours, and was brought to a close 400 miles from Paris, the place of departure. It was a very difficult thing to land the monster. It dragged along the ground, in consequence of the high wind blowing, a distance of seven miles, and no one in the car escaped entirely uninjured.

The largest balloon ever constructed was probably Godard's fire-balloon. It had a capacity of nearly 500,000 cubic feet of gas, and was heated by

an eighteen-foot stove, which, with the chimney, weighed 980 pounds! A couple of successful ascensions were made with this balloon in 1864, from Cremorne Gardens.

The ascents of M. Glaisher in the interests of science in 1862, are among the most remarkable ever made. He made in all, about twenty-eight ascents, reaching various heights. The greatest height reached was on Sept. 5, 1862, when he rose nearly seven miles from the earth. His description of this ascent is exceedingly interesting. He left the ground at three minutes after 1 P. M. The temperature at starting was 59, and the dew-point 50. One mile above the temperature was 41 and the dew-point 38. "Shortly after, we entered a cloud of about 1,100 feet in thickness, in which the temperature of the air fell to 36½ degrees, the dew-point being the same, indicating that the air here was saturated with moisture. On emerging from the cloud at 1:17 we came upon a flood of strong sunlight, with a beautiful blue sky, without a cloud above us, and a magnificent sea of clouds below—the surface being varied with endless hills, hillocks, mountain-chains and many snow-white masses rising from it." When five miles high, the voyagers experienced some difficulty in breathing; and when they had attained the elevation of 29,000 feet M. Glaisher laid his arm on the table, possessed, he says, of its full vigor, but, on being desirous of using it, he found it powerless. He continues:

"I tried to move the other arm and found it powerless, also. I then tried to shake myself and succeeded in shaking my body. I seemed to have no limbs. I then looked at the barometer, and whilst doing it, my head fell on my left shoulder. I struggled and shook my body again, but could not move my arms. I got my head upright, but for an instant only, when it fell on my right shoulder, and then I fell backward, my back resting on the side of the car, and my head on its edge. When I shook my body I seemed to have power over the muscles of my back, and considerable power over those of my neck, but none over either my arms or my legs; in fact, I seemed to have none. As in the case of the arms, all muscular power was lost in an instant from my back and neck. I dimly saw Mr. Cogswell (his companion) in the ring, and endeavored to speak, but could not; when, in an instant, intense dark blackness came, the optic nerve finally lost power suddenly. I was still conscious, with as active a brain as at the present moment while writing this. I thought I had been seized with asphyxia, and that I should experience no more, as death would come unless we speedily descended. Other thoughts were actively entering my mind when I suddenly became unconscious, as on going to sleep. . . . My last observation was made at 1:54, at 29,000 feet. Whilst powerless I heard the words temperature and observation, and knew that Mr. Cogswell was in the car speaking to me and endeavoring to arouse me. . . . Therefore, consciousness and hearing had returned. I then heard him speak more emphatically, but I could not see, speak or move. I heard him again say: 'Do try—now do!' Then I saw the instruments dimly, then Mr. Cogswell, and very shortly saw clearly. I rose in my seat and walked round, as though waking from sleep, though not refreshed by sleep, and said to Mr. Cogswell: 'I have been insensi-

ble.' He said: 'You have, and I, too, very nearly.' . . . Mr. Cogswell told me he had lost the use of his hands, which were black, and I poured brandy over them."

At that height it was intensely cold. Hoar frost formed around the neck of the balloon. Mr. Cogswell's hands were frozen. The water in the vessel supplying the wet-bulb thermometer was solid ice. Pigeons let out of the balloon at six or seven miles dropped down like so much lead. While M. Glaisher was insensible it is estimated that the balloon reached a height of 37,000 feet, or seven miles.

The above extracts are taken from the British Association report, and are to be found, with much more, in the article on Aeronautics in the first volume of the new edition of the *Encyclopædia Britannica* — an article which has been of frequent use in verifying some of the facts above adduced.

The author of the article in the *Encyclopædia Britannica* says that the number of accidents that have occurred bears but a very small proportion to the number of successful attempts that have been made. Of 471 adventurers only nine were killed, and, of these, one owed his death to bravado, and six to the dangers attending the use of the fire-balloons. It must be remembered that most of these 471 adventurers made several ascents.

Balloons were extensively used in the American and Franco-Prussian wars. One that left Paris during the siege landed near Christiana, Norway, fifteen hours after its ascent — having in the meantime crossed the North Sea.

Great efforts have been made to devise some means of guiding balloons; but the medium in which they are necessariiy immersed subjects them to such a complex system of forces that it is doubtful if it will ever be possible to navigate them securely.

THE STEAM FIRE ENGINE.

The great importance of early, rapid and incessant work in fighting fire, gave rise to the steam fire-engine; one of the greatest and most important inventions with which the world has been blessed. The old-fashioned hand-engines were too slow in operation, and required too much manual labor. About 1850, a stationary engine was employed, in New York, to pump water into the hand engines; but it was worse than nothing and was soon abandoned.

The first real steam fire-engine was made for the Cincinnati Fire Department, in 1832. A steam boiler, made for the purpose, was attached to the steam cylinder and pumps of a hand engine, and the whole put on wheels. At its first trial steam was raised from cold water, and water thrown one hundred and thirty feet, through three hundred and fifty feet of hose, in four minutes and five seconds. Such a brilliant success awakened the greatest enthusiasm, and made the steam fire-engine a fixed fact. An engine was immediately built, and put in charge of a picked company, which was kept under salary by the city. So we see that the "paid fire department" system is a twin brother of the steam fire-engine. The people of Cincinnati now have their reward — for to-day their fire department is acknowledged to be the best in the world.

The engine thus built, was called the "Citizens' Gift," and is still in

use in Cincinnati. Immediately after the organization of the paid system, Miles Greenwood, one of the wealthiest and most prominent citizens of that place, and the proprietor of the largest iron foundry in the city, was appointed Chief Engineer. To him and to Enoch Megrue, his successor, the world is principally indebted for the present perfection of the steam-fire system.

Other engines were soon made, and put in service under the energetic and sensible management of Mr. Greenwood. They were built by Messrs. A. & B. Latta, of Cincinnati, who are still doing the same work in that city. The first one made after the "Citizens' Gift" was called the "Uncle Joe Ross."

After the Cincinnati success, the steam fire-engine was rapidly introduced in all the principal cities of the Union, and is now used in every town of any pretensions. Other machinists followed the example of the Lattas, and engines are now made by Reaney & Neafy, of Philadelphia, Lee & Larned, of New York, Silsby Manufacturing Company, of Seneca Falls, New York, the Amoskeag Manufacturing Company, the Boston Locomotive Works, and many others. Lee & Larned make most of the engines for the New York City Fire Department.

The Amoskeag engines work with vertical cylinders and pumps, thereby avoiding much of the shaking that makes other machines objectionable. The arrangement of their guage cocks is also peculiar. They cover the whole side of the boiler, thus showing immediately the height of the water, and this enables the engine to make steam with very little water and in a very short time. They weigh about six thousand pounds, and are drawn by horses.

In the Silsby, the engine and pump are rotary. They are made to be drawn by men or by horses. The smallest are from 3,800 to 4,300 pounds weight, including fuel, water and hose. They throw a $1\frac{1}{8}$ inch stream 250 feet, with forty pounds of steam. These are intended to be drawn by men. The larger ones weigh from 5,100 to 5,800 pounds. They will throw two one-inch streams, 240 feet, and will raise steam and be at work in four minutes. One great advantage of the Holly pump is that it runs steadily, no chocking being required to keep the engine in place, as is the case with all engines using reciprocating pumps.

FROST BITE.

Exposure to the cold, of severe degree, often leaves the fingers and toes, nose, ears and lips, more or less frozen. This condition, short of absolute death of the part, is termed frost bite.

When the circulation of any part begins to succumb to the influence of the cold, it becomes puffy, blueish, and smarting. This is because the blood moves more slowly than natural through the vessels exposed near the surface. Soon this blueness disappears, and the part becomes pallid, as if the influence of the cold had contracted the vessels to an extent incompatible with the passage of blood through them. The *pain* at this point ceases; indeed, until he meets a friend, he often does not know of his mishap. At this stage, the injury has become so great that, unless proper means are taken to restore circulation, complete death of the part ensues, and in due

time it sloughs away, and is detached from the line of living tissue.

What takes place in a part of the body, known as frost bite, may take place in the whole of it, which is known as "frozen to death." The blood of the extremities being gradually forced from them, under the continued subjection to the cold, is forced inward upon the larger blood vessels, heart, lungs, and brain. There is increasing difficulty in breathing, owing to the engorged state of the chest, and, what should always be remembered by one so exposed to cold, an unconquerable desire to sleep. To sleep, then, is to die. If the person exhibits such a symptom, he must, by all means, be kept constantly moving.

Treatment. — Persons exposed like those just described, must be treated promptly, and with one thing never lost sight of,—that is, keep the frozen person away from the heat. A person taken up insensible, or approaching it, from exposure to the cold, should be taken into a cold room, his clothing removed, and he thoroughly rubbed with snow, or cloths wrung out with ice water. The friction to every part of the body, particularly the extremities, must be continued for some time, until signs of returning animation appear. When the frozen limbs show signs of life, the person should be carefully dried; put in a cold bed in a cold room; artificial respiration used until the natural is established; then brandy given, also ginger tea and beef tea. Usually, by this time, medical advice will have been secured, to direct further treatment. Should it not, do not forget that the patient is to be brought by degrees into rather warmer air; and, lest in some part there might still be defective circulation, the person should be kept away from exposure to the heat of the fire. Milder degrees of the same condition, as suspension of life in the ear, nose, finger, or toe, from exposure to cold, must be treated with the same general directions in view. The part should be kept away from the heat, and rubbed with handfuls of snow, or towels dipped in cold water, until circulation appears re-established.

FIRST VESSEL BUILT IN MASSACHUSETTS.

The first vessel ever built in Massachusetts was a ship launched at Mystic, now Medford, on the 4th of July, 1631, and named by Governor Winthrop, to whom she belonged, The Blessing of the Bay. In the course of the season this vessel made several coasting trips, and soon after visited Manhattan Island, New York. "On this occasion," says Governor Winthrop, "the sailors were surprised on seeing, on Long Island, Indian canoes of great size." Another vessel of 60 tons, called the Rebecca, was built in 1633, at Medford, where Mr. Cradoch had a ship yard. A ship of 120 tons was built at Marblehead by the people of Salem, in 1636. The business of ship building appears to have received its first impulse about this time from the same cause which threw the colonists upon their own resources for the supply of many of the necessaries of life. The first ship built in Boston, of which we have any record, was the Trial, of about 160 tons. She sailed for Bilboa on the 4th day of June, 1642, with Thomas Graves as master, laden with fish, which she sold there at a good rate, and from thence she freighted to Malaga, and arrived there March 23, 1643, laden with wine, fruit, oil, iron and wool,

which was "a great advantage to the country, and gave an encouragement to trade." Thus early began the circuitous and profitable trade to distant ports, in which colonial vessels, at no remote period, bore so prominent a part. In 1642, five other vessels were built at Boston, Plymouth, Dorchester and Salem; and in 1644, two of 250 and 200 tons, respectively, were built at Cambridge and Boston. The first large ship built in Boston was one of 300 tons, in 1646.

CAST IRON PLOWS.

In the early, and almost the recent, days of American agriculture, the principal farm implements were the plow, harrow, scythe, sickle and rake. The plow and harrow were worked by horses or oxen — the others by hand. The great improvements which have been made of late years enable us to do most of this work by horse-power; and thus greatly lighten hard labor. But all attempts to break the soil by steam or machinery have thus far failed. The attention of farmers and agricultural machinists has, therefore, been specially directed to the material and formation of the plow, in order to secure the most satisfactory results at the smallest expense.

In the earlier colonial days, there were no plows in America. The lands were cleared and turned by mattocks and hoes. It was customary then for the fortunate owners of plows to travel about the country, working them, as the scissor-grinders do now. In 1637, Massachusetts had thirty seven plows. In 1648, Virginia had one hundred and fifty. In New England a bounty was paid in many towns to persons who would keep a plow and do this itinerant work.

The old fashioned plow was a clumsy thing, made of wood throughout. The French settlers in Illinois were, probably, the first to use iron in a plow — their machine consisting of a small iron point tied to the plow with a strip of raw hide. The Corey plow, with a clumsy wrought iron share, and all the rest wood, was most extensively used in the Atlantic States, during the last century. Another, called the "bull plow" was also extensively used. The landside was a flat bar. The point was a lump of iron, shaped like half a lance-head. The mould-board was wood, most awkwardly fastened.

The first patent for a cast-iron plow was secured by Charles Newbold, of Burlington, New Jersey, in 1797. It combined the mould-board, share and landside, cast together. It was a great improvement on the old plow; and Peacock, who patented another plow in 1807, paid Newbold $500 for the privilege of using parts of the ideas involved in that invention. James Small had invented a cast-iron mould board in Scotland, in 1740, but he adhered to the wrought-iron share. The cast-iron share was the first used in America.

Newbold's machine attracted great attention. In 1798, Thomas Jefferson gave it his attention; and wrote a treatise on the form of the mould board, giving his idea of what its exact form and curvature, mathematically calculated, should be. From that time a great deal of attention was paid to the plow; and it is now considered to have almost reached perfection. One great advance has been in the adaptation of different forms of plows to different soils. The money value of the plow has also been greatly decreased, by its manufacture in large factories and by machinery,

instead of by the slow and laborious process of the country blacksmith-shops. More than four hundred patents for improvements in plows have been issued from the United States patent office since Newbold's invention.

EARLIEST MODERN NEWSPAPER.

It seems that to Italy the world is indebted for the origin of the newspaper. Centuries before the Christian era, or, to give the precise date according to the best authorities, 691 B. C., a daily journal called the *Acta Diurna* was published at Rome. It was not in the form of the printed paper sheet that is now-a-days left at every intelligent man's door in the early morning; nor was it issued in copious editions and circulated among the subscribers for a stipulated consideration. The *Acta Diurna* was a public enterprise, supported by government, and the few copies struck off in Latin script upon white wooden tablets were hung at conspicuous points in the streets and the frequented places of the city, and gave to the curious passer-by the latest intelligence of current events. With the downfall of the Western Empire, journalism perished; and for upward of a thousand dreary years it was one of the lost and forgotten arts.

By Italian genius it was finally revived again, and Venice was the scene of its second birth. There are now in the Magliabechia Library at Florence thirty volumes of the oldest modern newspaper of which we have any knowledge. It was entitled *Gazetta*, as some say, from the word *Gazzera*, signifying magpie or chatterer. And, according to others, from the name of the small coin for which the paper was sold. It was published at Venice once a month by order of the government, and continued to be written in script, even after printing had been invented. The last number is dated in the sixteenth century. The earliest French journal, the *Gazette de France* a newspaper still in existence, we believe, was edited by Renaudot, a physician in Paris. It appeared as a weekly, the initial nunber being issued in April, 1631. It was patronized by the King Louis XIII., and contained at least one article penned by the Royal hand. It also enjoyed the support of Cardinal Richelieu.

The British Museum preserves some copies of a newspaper called the *English Mercurie*, and professing to have been printed under the authority of Queen Elizabeth in 1588. The title of one of the numbers reads thus: — "*The English Mercurie*, published by authority, for the prevention of false reports, imprinted by Christopher Barlur, Her Highness's printer, No. 50." In it is an account of the Spanish Armada, under the heading: "A journall of what passed since the 21st of this month, between her majestie's fleet and that of Spayne, transmitted by the Lord High Admiral to the Lordes of council." But the papers were not published at the date and in the circumstances pretended. They have been proved to be clever forgeries, executed about 1766. In 1622, during the reign of James I., a paper appeared under the title of the *London Weekly Courant*. In 1643, in the time of the Civil War, a variety of publications, claiming unworthily the office and name of newspaper were produced; but in fact, the first genuine news journal published in England was established by Sir Roger L' Estrange in 1665. It bore the name of the *Public Intelligencer*, and survived until the *London*

Gazette was transferred from Oxford to London, in February, 1866. The first regular newspaper produced in the United States was the Boston *Newsletter*, which appeared April 24, 1704. In September, 1698, an enterprising printer in Boston had undertaken to start a newspaper, but the first edition was suppressed by the authorities, and only one copy is now known to exist.

THE MANUFACTURE OF WALL AND DECORATIVE PAPER HANGINGS.

There is scarcely a branch of manufacture that has increased to such an extent as the production of paper hangings and fresco decorations. It is but a comparatively short time since the walls of dwelling houses were all painted, but very few persons using paper, as the manufacture of paper hanging was very limited and cost quite a large sum in comparing their cost with the prices at the present time. This house was the first who introduced into this country, in the year 1850, the manufacture of fresco decorations. They also claim the honor of introducing the first bronzing machine used in producing bronzed paper hangings in this or any other country; also the first perfect copies of all kinds of marbles and woods which are now used in the decorating of halls and public buildings.

A brief description of their works and how the different kinds of paper are prepared and finished, will no doubt be interesting to all. The paper is received from the mills in what is known as the *raw state*, in large rolls containing from 1,200 to 1,500 yards, without a break or a tear; some of the paper is 20 inches, some 22 and some is 40 inches in width, according to the description of goods for which they are intended, and that are so pleasing to the eye when finished. In the basement of one of the buildings is the color-mixing department, where the colors used in the establishment are mixed into all the known shades of color, ready for printing the paper. Here are vats, tubs, pails, grinding machines, etc., of every description necessary for the business. Here is also prepared the "grounding" made from various clays brought from New Jersey, Georgia and South Carolina. English china clay and Paris white are also used to a large extent. The New Jersey clay is the finest and receives the finish polish and is used in preparing or grounding what is known as satin paper. In an adjoining room is the polishing department. Here are patent furnishing or satining machines. These machines are a great improvement over the old style of machines as they require but one large cylinder brush with five smooth iron rollers that polishes the surface evenly and smoothly at once, while the old machines worked the brushes on top, and the rollers underneath; after the paper leaves these machines it is ready for printing in colors, bronzing or embossing in gold. The machine for printing wall paper (or figured paper hangings) consists of cylinders of great diameter, carefully covered with felt, over which the paper passes. The paper is delivered from rotary spindles, the end of which is caught up by machinery and passed to the cylinder. The color boxes are set below the centre of the cylinder, and the color is passed to the color block (or die) by means of an endless cloth or blanket; the color block is then applied to the paper by the motion of the machine

and the desired impression given. For each color on a pattern of paper there are separate blocks; and the machines are so perfect, each block touches the paper in the exact place required, so that eight, twelve or more colors are put on the pattern with one revolution of the large cylinder. After the paper has passed through the printing machine, it passes to the hanging-up racks, which carry it along by means of an endless belt in loops of sixteen feet or more, passing over steam-pipes which dry it before reaching the end of the rack. At the end of the rack are rolling machines, which rolls the paper by means of split spindles. There is also attached a knife for cutting the paper to the desired lengths. These machines are capable of running of about 2,500 rolls each, per day. The bronzing machines are similar to those above described, except that varnish is applied in printing the pattern instead of color. The bronze powder is applied and it is then returned to the brushing or polishing machine; they remove the surplus metal and burnish that which remains upon the paper forming the pattern or figure. The next is the block-cutting department. Here the most skillful workmen are employed. Sugar maple is the wood that is mostly used. First the designs are traced on the wood, then strips of brass are inserted to form the outline of the figures, the surplus wood being chipped off. Inside of the figure, formed by the strip of brass, is filled in with felt, so as to receive the color. Each color requires a separate block or roller, and some of the elaborate designs require ten or twelve different rollers. Next are what is called fine gilt, hand-made goods, which are produced by hand-printing. This method is yet unequaled by machinery in the production of this class of goods. We next enter the room that is known as the gold stamping room. In this process the paper is sprinkled with powdered shellac where the figure is to be stamped; this is covered with gold leaf. It is then passed between steam heated plates, with metal dies secured to their surface, or beneath the hot plates of a powerful stamping press. The surface leaf is then brushed off and turned into bronzing powder. All the dies for this class of goods are cut from brass. We now come to the hand printing and flocking department: flocked or velvet paper is made by the application of various *colored wools* ground to powder and set, or flocked, on to the paper by means of gold size; the ground wools used in this process are imported. In hand printing but one color at a time can be applied. The color blocks are cut on a flat surface and a strap attached to the back, (similar to a horse brush,) by which means the workman, after dipping the face of the block on the color tray, can apply it to the paper drawn under him on the printing table, and by means of a lever attached to the table or press, the block is pressed down on the paper and leaves the impression in proper color and desired pattern. In the hand bronzing and fresco decorations, the bronze is applied by hand blocks with gold size. The paper is then run through machines, in which rollers distribute the bronze powder over the surface and it is then hung up to dry.

After drying, the surplus powder is removed by passing the paper through the dusting machines. The colors are afterward imprinted in addition to the bronzing, by passing them over the printing tables, and each color is stamped with its appropriate block, as above described. In the manufact-

ure of paper hangings and fresco decorations, a description of which we have given above, the house of Robt. Graves & Co. stand at the head of the business in this country.

COTTON-CULTURE.

The great usefulnesss and enormous manufacture and sale of this fabric, and the especial adaptability of the soil of the Southern United States to its growth, make it a subject of great interest to the people of America. It represents so vast a wealth as to always hold a prominent place in the financial politics of our country. For three-quarters of a century, the boast of the Southerner was that "Cotton is King"; and until the inexhaustible agricultural resources of the Great West became available, his boast was strictly true.

The appearance of the plant in growth is so beautiful as to baffle description. People who have never seen it can form no idea of the uniform and delicately beautiful appearance of a cotton plantation. In the first stages of its growth, it is nearly all leaf of a peculiarly rich, dark green. Often, in the old time, the traveler could see thousands of acres of it in one continuous expanse, broken only by an occasional roadway, or a long, crooked line of rail-fence. When the plant is in full bloom, it presents a gorgeous sight. The leaves, although thick, are entirely concealed by the white bolls; the fields are like one broad sea of glistening white — whiter than snow; and the houses and "gins" that, here and there, dot its surface, look like islands in the bright and quiet sea.

Columbus found cotton in Cuba, in 1492, when he made his first landing in the New World. Cortez found it in Mexico, and Magellan found it in Brazil. In 1519, Pizarro found it in Peru, and de Vaca found it in California. Thus we find that it grew from ocean to ocean, throughout nearly all the middle third of the Great American Continent. There are three species, all of which were seen in all these countries — the herb, which grows annually, the shrub, which lasts from three to five years, and the tree, which has a life of about twenty years. The cotton of the United States is cultivated entirely from the herb. Since our great war, its cultivation has been attempted, experimentally, in some of the Northern States, but it cannot be lucratively cultivated north of Tennessee and North Carolina. The best quality and the largest yield are in South Carolina, Florida, Southern Georgia, Alabama and Mississippi and Central Louisiana. The first labor expended on it was in South Carolina; and that State furnishes the finest fibre. That State is famous for the celebrated "Sea Island" cotton, so called from the islands along the coast of South Carolina and Georgia, the seed from which, by constant culture, has developed the finest and softest material. This quality has also spread throughout the extreme southern part of the United States, and is much superior to the cotton grown on the uplands, farther North, where the same seed, brought from the sea shore, rapidly deteriorates.

Cotton is of slow growth, and its productiveness and quality depend greatly upon the length of the warm season. In the far South, where the summer is longest, it attains the greatest growth and the finest texture. The cotton-fields of Tennessee and North Carolina look almost like sage-brush in comparison with the luxuriant fields of the sea-coast. In Louisiana it is planted in February. The harvest

generally commences about the first of August, and continues for more than three months. In this low latitude, the fields are generally picked three times over. In the northern region, such as Kentucky, Tennessee, North Carolina, Northern Mississippi, Alabama and Georgia, the planting season is later, the shrub smaller, and the yield much less. The writer has known a plantation on Red River to yield three bales (fifteen hundred pounds) to the acre. In the uplands, a smart negro cotton-picker used to average from four to six hundred per day. On the richest fields of Louisiana, an ambitious fellow could exceed one thousand pounds. But the cotton as picked in the field is vastly heavier than that known to commerce, as it contains all the seed, which is nearly two-thirds of the whole weight. For instance. Fifteen hundred pounds of "raw cotton," after passing the gin and being packed in the bale, weighs about five hundred pounds.

The separation of the cotton from the seed is the first and most important item of its manufacture. This is done by a machine known as the "cotton gin." The seeds are remarkably plentiful ("thicker than seeds of a watermelon,") and adhere with great tenacity to the cotton. Consequently great force is required to tear them apart. The early gins were merely sets of rollers, by which the cotton was torn away from the seed, and passed through the rollers, leaving the seed behind. The process was tedious and incomplete. The present gin is a very simple but ingenious machine, invented by Mr. Whitney, a Connecticut gentleman, shortly before the commencement of the present century. It is called the "saw gin." It consists of a row of circular saws, placed very close to each other, on a revolving cylinder. Before the cylinder is a mouth for receiving the cotton, and behind it are brushes to brush the clear cotton from the saw-teeth. The saws revolve rapidly, tearing the cotton off, and leaving the seeds to drop through the mouth in front.

The invention of this machine caused an immediate and enormous increase in the culture of cotton, and made the plant, as a mercantile staple, a power in the commercial world. The first exportation thereof was from Charleston, South Carolina, in 1784. Its extent was *eight bales*. The crop of 1874 was nearly five million bales.

DAGUERREOTYPES.

Discoveries in science are the result either of experiment, of thought, or of chance.

Daguerre's discovery of the influence of the vapor of mercury upon sensitive plates of silver is one which is included among chance discoveries. He had been experimenting on silver plates rendered sensitive by iodine, and had, after exposure, put them in a cupboard of chemicals. To his surprise he found, after a time, pictures developed themselves on the plates. Attributing the effect to some chemical, he removed the chemicals one by one, until all had been removed. The effect, however, continued. He then found an unknown and forgotten flask of mercury, which gave out its vapor, and thus produced the effect observed —and this was the origin of the Daguerreotype process. But this was not purely the result of chance. It was the previous training and previous experience which arranged the conditions that led to the discovery, and which enabled the mind to seize

upon those very facts which resulted in success. Training and experience are therefore essential in seizing upon abnormal indications of Nature, as they are in comprehending and appreciating her laws and applying them effectively to practice.—*Telegraphic Journal.*

PHOTOGRAPHY IN AMERICA.

It is not generally known that Prof. Morse, the inventor of the electric telegraph, was the first to introduce photography in America. The following letter, written by him to the *Philadelphia Photographer*, gives an interesting account of his connection with this branch of art:—

NEW YORK, Nov. 18th, 1871.

EDWARD L. WILSON, ESQ., *Dear Sir:*—In your letter of the 10th instant, you ask of me a sketch of my connection with the photographic art. I cheerfully comply with your request.

In 1838, I visited Europe with my telegraphic invention, and early in the spring of 1839, in Paris, I formed the acquaintance of M. Daguerre, whose discovery of fixing the image of the *camera obscura*, in connection with M. Niepce, was creating a great sensation in the scientific world.

A proposition at this time was before the French Chamber of Deputies, to grant to Messrs. Daguerre and Niepce a pension on condition that their process was given to the public. M. Daguerre had very freely shown to high officials the result of his process, but by the advice of the distinguished Arago, who had charge of the pension proposal in the Chambers, he abstained from any publicity of his results until his pension should be secured. At this same time my telegraph was exciting in the French capital a similar sensation. I had made my arrangements to leave Paris for home in March of 1839, and one morning in conversation with our eminent and worthy consul, Robert Walsh, Esq., I lamented the necessity of leaving Paris without seeing these photographic results. He at once entered into my feelings, and said: "I think you will find no difficulty in obtaining a sight of them. Drop a note to M. Daguerre, and invite him to see the telegraph, and I have no doubt he will return the compliment by inviting you to see his results." The plan was successful. M. Daguerre invited me to see his results at his diorama, where he had his laboratory, and the day after, accepted my invitation to witness the operation of my telegraph; and it is a noticeable incident that during the two hours in which he was with me, his diorama and laboratory, and the beautiful results I had seen the day before, were consumed by fire. In my interview with him, however, I requested him, so soon as his pension bill was passed, and the publication of his process was made, to send me a copy of his work, which he courteously promised to do, and accordingly, in the summer of 1839, I received from him probably the first copy which came to America. From this copy, in which, of course, were the drawings of the necessary apparatus, I had constructed the first daguerreotype apparatus made in the United States. My first effort with it was on a small plate of silvered copper, about the size of a playing card, procured from a hardware store; but defective as it was, I obtained a good representation of the Church of the Messiah in Broadway, taken from a back window in the New York City University. This was, of course, before the construction of the New York Hotel. This I believe to

have been the first photograph ever taken in America. Perceiving in its earlier stages that photography was an invaluable and incalculable aid to the arts of design, I practiced it for many months, taking pupils, many of whom at this day are among the most prosperous photographers. I early made arrangements to experiment with my eminent friend and colleague in the University, Prof. John W. Draper, building for the purpose a photograph-studio upon the top of the University. Here I believe were made the first successful attempts by Dr. Draper in taking photographic portraits *with the eyes open*, I having succeeded in taking portraits with the *eyes shut*, for it was considered at that date that the clear sunlight upon the face was necessary to a result.

And here it should be stated, that in reply to the question which I put to Mons. Daguerre, Cannot you apply this to portraiture? he gave it as his opinion that it would be impracticable, because in obtaining his results on still objects, the time necessary was from fifteen to twenty minutes, and he believed it impossible for any one to preserve an immovable position for that length of time. The quick or instantaneous process was not then discovered, Thus you have, in brief, my connection with the art, which owes its existence to Messrs. Daguerre and Niepce, and in which I profess to be only a humble follower. The wonderful improvements which have since been made by scores of ingenious men in various countries have established the photographic art as one of the most useful, as well as beautiful, discoveries of the age.

With respect,

Your obedient servant,

Sam'l F. B. Morse.

SAMUEL F. B. MORSE.

It has often been noticed that the men to whom the world owes its greatest debts have been farthest removed from the spheres of action in which their inventive genius has most shown itself. A portrait-painter, Robert Fulton, was the father of steam navigation. And another portrait-painter, Professor Morse, was the father of the telegraph system, and a stepfather of photography.

Samuel Finley Breese Morse was born in Charlestown, Massachusetts, April 29th, 1791. His father was a clergyman, well remembered among our elder people as the author of the celebrated "Morse's Geography," which was a standard school book until the political changes of the world required a new one. Professor Morse was carefully and thoroughly educated, and graduated at Yale College in 1810. He had a passion for painting, and chose it as the profession of his life. He was a warm personal friend of Washington Allston, and went to England with him in 1811. Charles Robert Leslie, visiting that country soon after, fell in with Morse, and a close friendship, which lasted through life, sprang up between the two young painters. In London, Morse pursued his studies under Copley and West. In 1815, he returned to America, and commenced the profession of his art in Boston. There he did not do well. After a short sojourn, he went to New Hampshire, and earned a nomadic living by painting portraits at fifteen dollars apiece. Thence he went to Charleston, South Carolina, where he found plenty of work at sixty dollars instead of fifteen. In 1824, he painted a portrait of LaFayette for the city of New



Sam'l F. B. Morse.

York. In 1829, he went again to Europe, and plied his pencil in England, France and Italy.

While in college he was an enthusiastic student of chemistry. In 1826 he made a careful study of the electro-magnet. This study convinced him of the practicability of sending messages between remote points by electricity. This idea became the ruling passion of his life, and gave to the world the greatest and most valuable of its inventions. In 1835, he had made a telegraphic instrument which was operated successfully, as seen by all his personal friends. In 1837 he made another and an improved one, and was then able to send messages from both ends of his little wire. In 1838 he went to Washington to petition Congress for aid to build a line of telegraph from Washington to Baltimore; but the wise heads of the nation laughed at the idea as an impossibility. In 1842 he renewed the struggle, and Congress appropriated $30,000 for the Washington and Baltimore line. And then the telegraph was born. The little line, twenty-five miles long, was the precursor of millions of miles of telegraph wire, which now bind all the great, busy world into one bee-hive.

Professor Morse lived to see his invention become a necessity in all lands, and to receive honors for it from every civilized government. He died in New York, April 2d, 1873.

HOW THE FRENCH BRING DROWNED MEN BACK TO LIFE.

The author of *The French at Home* says that in his walk, one morning, he saw a man pulled out of the water, apparently drowned. He was laid on the right side, the face turned toward the ground, and the jaws open to facilitate the escape of water. Several times the head was placed a little lower than the rest of the body for the same purpose, but only for a few seconds at a time. In the meanwhile there was a regular manipulating process to induce breathing, which consisted in pressing the abdomen, stomach and sides of the chest, but softly. The efforts were without effect; the man looked as if he had seen the last of earth. Then the prostrate figure was carried to the nearest station for the rescue of the drowned. Here the man was stripped and wiped dry, and he laid, turned down on the side, between two blankets on a mattress; the manipulating process was resumed, with intervals of about a quarter of a minute between each pressure of the body, the pressure being repeated fifteen or twenty times, followed by a suspension of twenty minutes. Twenty minutes passed in this way, when a physician, employed on this kind of service, appeared and took charge of the case. A warming-pan filled with hot water was passed over the body outside of the blanket, particularly over the pit of the stomach and the sides of the chest. This was alternated with a gentle friction of hot woolen mittens and the naked hands, and the soles of the feet and palms of the hands were vigorously rubbed. An operator breathed into the mouth of the man by means of a tube.

These efforts were also proving in vain, the physician had recourse to the introduction of tobacco smoke into the intestines. In about ten minutes the man gave a feeble sign of life, whereupon all manipulation was discontinued lest it should interfere with the natural movement. Soon he showed a desire to vomit. How long

the process lasted is not stated, but the reader will see that it was lengthy. A few days after, the writer attended a ball, and among the most lively dancers, he saw the drowned man.

COSTUMES IN ANCIENT TIMES.

Julius Agricola, being appointed to the command in Britain, A. D. 78, succeeded in perfectly establishing the Roman dominion and introducing the Roman manners and language. "The sons of the British chieftains," says Tacitus, "began to affect our dress. The *braccæ* were abandoned by the Southern and Eastern Britons, and the Roman tunic, reaching to the knee, with the cloak or mantle called the *sagum*, became the habit of the better classes. The change in the female garb was little, if any, as it had originally been similar to that of the Roman women. The coins of Carausius and the columns of Tanjan and Antonine exhibit the Celtic females in two tunics; the lower one reaching to the ankles and the upper about half-way down the thigh, with loose sleeves extending only to the elbows, like those of the German women described by Tacitus. This upper garment was sometimes confined by a girdle and was called in British *gwn*, the *gunacum* of Varo, and the origin of our word gown. The hair of both sexes was cut and dressed after the Roman fashion. Some change must have taken place in the apparel of the Anglo-Saxons after their conversion to Christianity at the beginning of the seventh century; for at a council held at the close of the eighth, it was said, "you put on your garments in the manner of pagans whom your fathers expelled from the world; an astonishing thing that you should imitiate those whose life you always hated." From the testimony of various writers we are led to conclude that little alteration in dress took place amongst the masters of Britain for nearly four hundred years. The civil costume of the Anglo-Saxons, from the eighth to the tenth century consisted then of a linen shirt, a tunic of linen or woolen, according to the season, descending to the knee, and having long, close sleeves, but which set in wrinkles, or rather rolls, from the elbow to the wrist. It was made like the shirt, and open at the neck to put on in the same manner. It was sometimes open at the sides and confined by a belt or girdle round the waist. Drawers reaching half-way down the thigh, and stockings meeting them, are alluded to by writers under the names of *brech* and *hose*. *Scin hose* and leather hose are also mentioned and may mean a species of buckskin or short boot, now and then met with, or, literally, leathern stockings. Toward the tenth century the national dress certainly became more magnificent; silk, which was known as early as the eighth century, but from its cost must have been exceedingly rare, was afterwards much worn by the higher classes.

During the reign of William the Conqueror, from the year 1066, the costume consisted of the short tunic, the cloak, the drawers, with long stockings, or pantaloons with feet to them, called by the Normans "Chausses." Shoes and leg-bandages are worn as before. Short boots are also common towards the close of the reign, and a flat, round cap like a Scotch bonnet. The Anglo-Norman ladies were attired similarly to the Anglo-Saxons. They wore the long tunic, and over it a garment answering to the Saxon

gunna, or gown, but which the Normans called a robe, and the veil or head-cloth, which in like manner they rendered *couvrechef*, from whence our word kerchief. The principal novelty is in the gown or *robe*, which was laced close to fit the figure, and had sleeves tight to the wrist, and then suddenly widening and falling to same depth. The borders of the dresses were gold and very broad. From the year 1087 to 1154, there was but one striking novelty, and that was the rage for lengthening every portion of the female costume. The sleeves of the tunics, and the veils or kerchief of the ladies, appear to have been so long in the reigns of Rufus and Henry I. as to be tied up in knots to avoid treading on them, and the trains or skirts of the garments lie in immense rolls at the feet. In the reigns of Henry II., Richard I., and John, A. D. 1154 to 1216, the coronation robes were composed of two tunics: the upper with loose sleeves of nearly equal lengths, and girdled round the wrist by a rich belt, over which was worn the mantle, splendidly embroidered. The female costume presents the same general appearance as that of its predecessors. The robe has however, lost its extravagant cuffs, and the sleeves are made tight, and terminate at the wrist. A rich girdle loosely encircled the waist; and Berengaria, queen of Richard I. is represented with a small pouch called *aulmoniere*, and in form like a modern rectangle, depending from it on the left side. The reign of Edward III., A. D. 1327 to 1377, was one of the most important eras in the History of Costume. The habits of the ladies of this reign were exceedingly sumptuous and extravagant, passing the men in all manner of curious clothing; and several distinct fashions appear to have existed at the same period. One consisted of the gown or kirtle, with tight sleeves sometimes reaching to the wrist, sometimes only to the elbow; and in the latter case with the same pendant streamers or tippets attached to them as were worn by the other sex. The gown was cut rather low in the neck, fitted remarkably close to the waist, and was occasionally worn so long, not only in the train, but in front, as to be necessarily held up when walking. Another newer fashion was the wearing of a sort of spencer jacket or waistcoat, for it resembles either or rather all three. It had sometimes sleeves reaching to the wrist, at others it seems to be little more than a skeleton of a garment with long and full skirts, wanting sides as well as sleeves, or at least the arm-holes cut so large that the girdle of the kirtle worn under it was visible at the hips. The *cote-hardie* was also worn by the ladies in this reign, buttoned down the front like that of the men, sometimes with tippets at the elbows; and there is an appearance of pockets in some of the cuts representing the styles of dress of this period. They wore rings of gold set with diamonds, rubies and sapphires; and also with ornamental stones, or amulets to prevent any venomous infection.

At the tournaments and public shows the ladies rode in parti-colored tunics, one-half being one color and the other half of another, with short hoods, or *liripipes*, (the long tails or tippets of the hoods) wrapped about their heads like chords. In the twenty-second year of Edward III.'s reign was founded the most noble Order of the Garter. The circumstance that suggested his choice of this symbol is another mystery, but all writers of any credit, combine to reject the popular

tradition which assigns to the accidental fall of a lady's garter (the Queen's or a Countess of Salisbury) at a grand festival. Sir E. Ashmole, in his History of Orders, considers the garter as a symbol of union and in this opinion he is followed by Sir Walter Scott and Sir Samuel Meyrick. Camden says that Edward gave forth his *own* garter as a signal for a battle that sped well, while other authorities doubt that garters were worn by men in those days. The leg-bandages abandoned in the previous century have no affinity to the short garter and buckle which forms the badge of this celebrated Order. In the time of Richard II. they wore long-toed shoes, which were fastened to the knee with chains of gold and silver. The tight sleeves of the preceding years were now out of fashion, and the Monk of Everham speaks of the deep, wide sleeves, commonly called *pokys*, shaped like a bagpipe, and worn indifferently by servants as well as masters. He says they were denominated the devil's receptacles, for whatever could be stolen was popped into them. Some were so long and so wide that they reached to the feet, and others to the knees. As the servants were bringing up pottage and sauces, their sleeves would go into them and have the first taste.

The most remarkable feature of the civil costume of the fifteenth century was the more frequent appearance of caps and hats of fantastic shapes, and the alternation of the chaperon from an almost indescribable bundle into a regularly-formed crown, with a thick roll called the roundlet, and having a long tippet attached to it which trailed on the ground. The female costume comprises, like that of the other sex, all the previous fashions, with fantastic additions too numerous to detail in words. Gowns with enormous trains, girdled tightly at the waist, and with turn-over collars of fur or velvet, coming to a point in front, and disclosing sometimes a square-cut under waist or stomacher of a different color to the robe. The sleeves are of all descriptions, but the waist is exceedingly short, as in Henry V.'s reign.

The shoes worn in 1523 were as absurdly broad at the toes as they were previously peaked or pointed. The new fashion is said to have commenced in Flanders about 1470. Paradin says that the two-feet long ponlaines were succeeded by shoes denominated duck-bills, the toes being so shaped, but still four or five fingers in length; and that afterwards they assumed a contrary fashion, wearing slippers so very broad in front as to exceed the measure of a good foot. About the middle of the reign of Elizabeth the great change took place that gave the female costume of the sixteenth century its remarkable character. The body was imprisoned in whalebone to the hips; the partelot, which covered the neck to the chin, was removed, and an enormous ruff, rising gradually from the front of the shoulder to nearly the height of the head behind. From the bosom, now partially discovered, descended an interminable stomacher, on each side of which jutted out horizontally the enormous *vardingale*, the prototype of that modern-antique the hoop, which has been so lately banished the court. The cap or coif was occasionally exchanged for a round bonnet like that of men, or the hair dressed in countless curls and adorned with ropes and stars of jewels, and at the close of the reign (for the first time) with feathers.

In the portrait of Elizabeth, taken

in the dress in which she went to St. Paul's to return thanks for the defeat of the Spanish Armada in 1588, in addition to the ruff, she wore a light mantle of some delicate stuff, with a high standing collar, edged with lace and expanding like wings on each side of the head. A pocket looking-glass was the common companion of the fashionables of both sexes at this time. The ladies carried it either in their pockets or hanging at their sides. In the reign of James I., the ladies all dressed in their great vardingales. When Sir Peter Wych was sent ambassador from James I., his lady accompanied him to Constantinople, and the Sultaness having heard much of her desired to see her. She was struck with the extraordinary extension of the hips of the whole party, and seriously inquired if that shape was peculiar to the natural formation of English women; and Lady Wych was obliged to explain the whole mystery of the dress in order to convince her that she and her companions were not really so deformed as they appeared to be. In the time of Charles II., the crowns of the hats were lower and the brims were turned up at the side, a row of feathers was placed around it, and the first approach was made to the cocked hats of the eighteenth century. So early as 1658, the petticoat-breeches had made their appearance in England, and the fashion of wearing long striped hose or stockings two yards wide at the top, with points through several eyelet-holes by which they were made fast to the petticoat-breeches by pointed ribands.

In the inventory of Charles II. we find a complete suit of one material under the familiar designation of coat, waistcoat and breeches. Pantaloons are mentioned in the same inventory. Neck-cloths or cravats of Brussels and Flanders lace were worn toward the close of this reign, and tied in a knot under the chin, the ends hanging down square. In the reign of James II. and William and Mary, shoe-buckles began to displace the rosettes. Some difficulty exists in assigning an exact date to their introduction. Buckles for shoes are mentioned as early as the reign of Edward IV. The earliest date assigned to the shoe-buckle properly so called is 1680. They became general in the reign of Queen Anne.

In the time of William and Mary, the elegant full sleeve was replaced by a tight one, with a cuff above the elbow in imitation of the coats of the gentlemen. The hair, which had latterly been permitted to fall in natural ringlets upon the shoulders, was now combed up like a rising billow and surmounted by piles of ribands and lace. In the time of George III., 1760, the hats were worn with a six inch brim. Some had their hats open before like a church spout or the scales they weigh flour on. Some wore them sharper, like the nose of a grey-hound. Round hats began to be worn in the morning, shortly after this date. The lace cravat was abandoned about 1735, and a black riband worn around the neck, tied in a large bow in front: to this succeeded white cambric stocks, buckled behind. About the same period the shirt-collar appeared and the ruffle vanished. The coat was made with lapels and a tail, being cut square in front above the hips, as well as the waistcoat which, deprived of the flaps, was soon made as ridiculously short as it had previously been long. Hoods of various colors were worn by ladies at the opera in 1711, and cherry color was the prevailing fashion. Scarlet stock

ings were worn by the fashionable belles, and they also had a practice of wearing black patches on various parts of the face. An exceedingly little muff was in fashion at this time. In 1745, the caps were smaller but the hats were larger. Aprons had become part of the dress of a fashionable belle during the early part of this century, and in 1744 they reached the ground. Thus we see that some of the prevailing fashions of the last few years were worn by our ancestors centuries ago.

THE OLD ELM ON BOSTON COMMON.

Among the historic trees in this country perhaps none have so great a prominence as the Old Elm on Boston common. It is almost the only well-preserved living relic of early colonial times, and, historically, is as famous as the royal Oak of Boboscal was in England.

Boston Common, on which it stands, is even, apart from its historic associations, one of the most interesting and delightful places in New England. It is full of quiet beauties, with its shaded walks, play-ground, deer-park, fountains, birds, and grand old trees.

Some of these trees ante-date the city's charter. They were planted by hands that long ago crumbled to dust; and one of them broke ground while Boston was yet Shawmut, an old Indian village situated on three bare hills, with the smoke-wreaths of its conical wigwams crowning their summits. This was the Great Tree, as it was called one hundred years ago, but which is now known as the Old Elm.

It has grown green in spring and golden in autumn through all the green springs and golden autumns of New England's history. The tree is the true American elm, so much admired for its spreading shade, its massive foliage, and drooping, roof-like limbs. It is seventy-two feet high, and twenty-three feet six inches in circumference at the base.

Except when newly clothed with leaves in spring or crowned with the pomps of autumn, it retains little of its original beauty. It is a relic of the far distant past, and belongs to a generation of trees that have long fed with their mould the flowers and the ferns.

The cherished relic stands nearly in the centre of the Common, at the edge of the rising ground where was placed the old Liberty-Pole of historic fame. It is surrounded by an iron fence, on the gate of which is the following inscription:

"This tree has been standing here for an unknown period. It is believed to have existed before the settlement of Boston, being full-grown in 1722. Exhibited marks of old age in 1792, and was nearly destroyed by a storm in 1832. Protected by an inclosure in 1854. J. V. C. Smith, *Mayor.*"

The tree is protected and strengthened by artificial supports. Iron bolts run through its large limbs. Its great trunk is filled with cement and protected by canvas. Seventy years ago there was an opening in its trunk almost large enough to shelter a man, and to afford a hiding-place for the children who played at its base. But this rent of ruin has long been closed; but out of sight decay is still slowly going on.

The English sparrows fly in and out of their little houses on the branches of the old tree. Boston, like Venice, protects the birds. As in the "City of the Sea," the hospitality of her church towers is extended to the doves, who build their nests and rear their young amid the ringing of the bells.

LAPLAND GLUE.

The bows of the Laplanders are composed of two pieces of wood glued together; one of them of birch, which is flexible, and the other of fir of the marshes, which is stiff, in order that the bow when bent may not break, and when unbent it may not bend. When these two pieces of wood are bent, all the points of contact endeavor to disunite themselves, and to prevent this the Laplanders employ the following cement: They take the skins of the largest perches, and having dried them, moisten them in cold water until they are so soft that they may be freed from the scales, which they throw away. They then put four or five of these skins in a reindeer's bladder, or they wrap them up in the soft bark of the birch-tree, in such a manner that the water cannot touch them, and place them thus covered into a pot of boiling water, with a stone above them to keep them at the bottom. When they have boiled about an hour, they take them from the bladder or bark, and they are then found to be soft or viscous. In this state they employ them for gluing together the two pieces of their bows, which they strongly compress and tie up until the glue is well dried. These pieces never afterwards separate. There is no doubt that the Scotch whalefishers, who frequently have to do with these people, were also aware of this, for, in the manufacture of Scotch glue, fish is largely used.

The Russian and Italian glue is very good and of a light color; it is made from the viscid matter extracted from skins, parings of hides, etc., boiled to a jelly. The manner in which the London glue is made, and also the glue of several other countries of Europe, is by boiling in water the soft and solid parts of animal matter, as the muscles, cartilages, tendons, bones, hoofs, hides, etc.; the impurities are then strained off, and the whole is boiled over again and again till it arrives at the proper consistency; it is then poured into glazed moulds the size of the cakes, and, when sufficiently set, is laid upon wire netting to dry, or hung up with a piece of string passed through it. The best glue made in England is the Salisbury glue, which is of very excellent quality. Good glue should swell when kept in cold water for a day or two; and it should be semi-transparent, of a brown color, and free from cloudiness.

GREAT FIRES.

Of the fires that occurred in the cities of antiquity but little is known. They were probably numerous. History mentions some that were the result of war. Of these, Persepolis, in the time of Alexander, and Rome, during the invasions of the Gauls, are conspicuous examples. Both of these cities were rebuilt.

The great fire in Rome is a vivid historical event, and probably will continue so while the world endures. It took place in the year of Rome, 817, and of the Christian Era, 64, and in the tenth year of the reign of Nero.

It broke out on the 19th of July, and lasted six days, when there was a short intermission; then another fire began, which continued three days. Between the two, the greater part of old Rome was destroyed, including its principal historical edifices, temples and palaces.

This fire has a peculiar place in history. Nero was popularly supposed to have kindled it, and to have pre-

vented its being extinguished; and a rumor prevailed that he watched the flames from the tower of one of his villas, chanting to his lyre the "Sack of Troy." To divert suspicion from himself, he began the first persecution of the Christians, who were charged with being the incendiaries.

Whether the Emperor was guilty of the crime imputed to him will never be known, but he certainly was guilty of persecuting the followers of the only true religion, some of whom were cotemporaries of the Savior.

The space over which the fire extended is computed to have been one-third of Rome, or more than thirteen hundred acres. Thousands of persons perished. The city was rebuilt in four years.

The greatest historical fire of modern times is that of London, in 1666, in the reign of Charles II. It broke out in a bakery on the 2d of September, and lasted four days. The number of houses destroyed was 13,000; and of churches, 89, including the Cathedral of St. Paul's, a famous historical edifice, and many other edifices hardly less renowned. St. Paul's was not rebuilt till more than thirty years later —and we believe the first sermon preached in the new church was that by Compton, Bishop of London, on the occasion of the thanksgiving for the Peace of Ryswick, at the close of 1697.

The London fire came the year after what is known as the Great Plague, of which one hundred thousand persons died; and as the plague has never since raged in London, the fire of 1666 has had the credit of having extirpated it by destroyiug the unhealthy buildings in which it was nursed and from which it spread.

There is something that borders on the ludicrous in the fact that the fire began at Pudding Lane and ended at Pie Corner.

Moscow is a city renowned for fires. It was burned three times in the sixteenth century,—the last fire occurring in 1571, or over three hundred years ago. A fourth great fire occurred there in the early part of the seventeenth century.

The greatest of Moscow's fires, however, was that of 1812, just after the French entered it in September, a few days subsequent to their great victory of Borodino. The city was fired immediately on the arrival of the invaders, and in a few days it became a mass of ruins.

The effect of this was to compel the French to leave, and to begin that retreat in which their army perished. The Russians have had great credit for destroying their city, yet it is by no means certain that they were the incendiaries. Strange though it may seem, it has never been settled whether the city was fired accidentally or purposely, by the French or the Russians. The Emperor Alexander was very angry with Count Rostophin, who was disposed to claim credit for the deed.

Constantinople has been considered the most inflammable city in the world, and it would require pages to give only the dates of her great conflagrations. The last of these fires was no longer ago than June, 1870. It was the greatest that had been known since that of Moscow, and it was said that the property destroyed was of the value of six hundred millions of dollars—doubtless a great exaggeration. Thousands perished in the flames.

New York was long held to be Constantinople's rival in fires. When the British took possession of the place, in 1776, it was nearly destroyed by fire,

which the Americans were charged with having kindled. If the charge was true, they anticipated what was attributed to the Russians just thirty-six years later.

New York's greatest fire was that of December, 1835, by which property to the value of twenty millions of dollars was destroyed.

The great Portland fire occurred July 4th, 1866, caused by the burning of fire crackers.

Chicago's great fire broke out Sunday, October 8th, 1871, about half past nine in the evening, in a small stable on the west side. In less than thirty-six hours it swept over 2,125 acres, destroying most of the business portion of the city as well as a great deal of the residence portion. There were burned 1,500 stores, 28 hotels, 60 churches, and about 14,800 other buildings. The value of the property destroyed was $195,000,000.

The great fire in Boston occurred on Saturday, November 9th, 1872. It broke out at 7 P. M., and was not checked until the afternoon of the following day. It burned over sixty-five acres of the very best part of the business portion of the city. There were 776 buildings destroyed. The total estimated loss was $73,590,000.

RAISING OSTRICHES.

The demand for ostrich feathers as an ornament for the head has become so great in different parts of the world, that, in certain places in Africa and in the East, ostriches are domesticated, and raised like common poultry. The business is called ostrich farming.

On these so-called farms, numbers of ostriches are kept solely for the growth of feathers for commercial purposes; the inclosures in which the birds are confined vary in size from fifteen to twenty acres, encircled by low stone walls, over which the ostriches never attempt to leap. A novel plan has been adopted near Gramastown for hatching eggs of these valuable birds artificially by means of an incubator. The eggs are kept to a temperature of of from one hundred to one hundred and five degrees of Fahrenheit's thermometer, by the aid of an oil lamp, at a cost of a trifle more than a penny for the twenty-four hours; the natural period of incubation in struthious birds (ostriches) is about forty-nine days.

Ostrich feathers are in constant demand, being employed for a great many purposes, and their value, commercially, varies considerably, in accordance with color and quality. The long white feathers which are plucked from the wings are esteemed the finest, and are worth, on the average, from $150 to $200 per pound, which usually comprises about eighty feathers.

These finer white feathers are mostly used by the court plume-makers. The process of cleaning consists in careful washing with soap and clean water, a soft brush being at the same time employed judiciously; after the scouring, the feathers are well rinsed and shaken out to dry. Next in value follow the long black and grey feathers, and lastly the smaller ones, which fetch about forty shillings a pound.

Feathers obtained from the wild birds are reckoned to be more valuable than those plucked from the farmed birds. The mode of hunting ostriches by the regular hunters has been thus described: The adult male bird is singled out of the flock of perhaps six or eight, at the season when the feathers are in the finest condition;

that is, when the quills have not arrived at their full hardness of development. The plume of the feathers is then delicate and soft. These feathers are then called blood feathers, and are considered of the greater value.

The hunter then follows it at a sharp trot, so as not thoroughly to alarm the bird, but follows it at perhaps ten miles or more at the same rate of speed, and then stops and off saddle, letting his horse feed and rest a little for about twenty minutes. The ostrich also stops. The hunter then mounts again, and follows up the bird at a fast gallop. The ostrich is now, however, stiff and tired after his previous exertion, and does not go along so fast, so that his pursuer soon runs him down, and knocks him on the head with a "sjambok," (a thick thong of hippopotamus or rhinoceros hide) and kills him at once. An ostrich in good plumage is worth about $80, and each bird has from two and one-half to three ounces of finest white feathers. Some hunters will get from fifty to eighty birds in a season.

EASTER EGGS.

The custom of eating eggs at Easter has been traced up, not only to the theology of Egypt, but to the philosophy of the Persians, the Gauls, the Greeks, and the Romans, all of whom regard the egg as an emblem of the universe and the work of Diety. "Easter," says Gebelin, "and New Year's have been marked by similar distinctions. Among the Romans the New Year is looked upon as the renewal of all things, and is noted for the triumph of the sun of nature, as Easter is with the Christians for the Son of Justice, the Savior of the world, over death by his resurrection." The early Christians of Mesopotamia had the custom of dyeing and decorating eggs at Easter. They were stained red in memory of the blood of Christ shed at his crucifixion. The Romish Church adopted the custom, and regarded the eggs as the emblem of the resurrection, as is evidenced by the benediction of Pope Paul V. about 1610, which read thus: "Bless O Lord! we beseech Thee, this Thy creature of eggs, that it may become a wholesome sustenance to Thy faithful servants, eating it in thankfulness to Thee on account of the resurrection of the Lord." Thus the custom has come down from ages lost in antiquity.

There can be little doubt that the use of eggs at this season of the year was originally symbolical of the revivification of nature, the springing forth of life in spring. The practice is not confined to Christians; at the feast of the Passover the eggs were used by the Jews, and at the festival (in March) of the new solar year which was kept by Persians, they mutually presented each other with colored eggs. This Feast of Eggs from a Christian point of view has been considered as emblematic of the resurrection and of a future life.

HISTORY OF ORGANS.

The name Organ is derived from the Greek *organon*, which signifies an *instrument* of action, or operation by which some process is carried on, and as applied in the mechanics of music, covers several instruments, the principles of the construction of which are somewhat similar. The hypothesis generally received as well founded is that the organ in its simplest state was a modification of the Pipes of Pan, or simply hollow reeds of various lengths, bound together and so arranged as to be rapidly swept over

by the mouth of the player, each pipe graduated as near as might be to some natural "note" of music. As early as two hundred years before Christ it is said that Ctesibius, the Alexandrian inventor of the *clepsydra*, or water clock, also invented an *hydraulicon* or hydraulic organ. Upon an ancient monument in the *Giardine Mattei* at Rome was carved an organ, parts of which bore strong resemblance to the organ of these times. It is said that organs were in use in England in the tenth century, and that Elfey, Bishop of Winchester, caused one to be set up in his cathedral in the year 951. They were coarsely constructed and of restricted capacity. The keys were struck with the fist, and the pipes were wholly of brass. The largest organs had only twelve or fifteen pipes up to as late as the twelfth century. An Italian inventor added half notes, and first introduced his improved organ to the Venetians. This was near the close of the twelfth century. Pedals, or foot-keys, were invented by a musical German mechanic by the name of Bernhard, in 1470. The most noted builders of organs may be mentioned, the Antegnati of Brescia, in the fifteenth and sixteenth centuries — later in the eighteenth century, Serrassi of Bergamo, and the Venetian Callido. Reed instruments, of which large quantities are sold in America, include melodeons, harmoniums, seraphines, and all instruments producing tones by free reeds without the use of pipes. The reed is a thin strip of brass, or other material, from half an inch to several inches iu length. It is fastened at one end over an aperture in a metal plate corresponding in size to the reed; a current of air is made to pass through the aperture causing the reed to vibrate and produce a musical tone. The size of the reed determines its pitch, and its shape and other conditions determine its quality. It is an American invention, for which letters patent were granted to Aaron Merrill Peasley in 1818. The original papers were signed by James Monroe, President, and John Quincy Adams, Secretary of State.

MATCHES.

As a matter of curiosity it would be interesting to know how the first man who made use of fire for any purpose obtained it. Perhaps is was supplied to him by some case of spontaneous combustion, or from some tree set on fire by lightning. This, however, is mere conjecture, though it is evident that it was a long time after the use of fire was known before simple and efficient means were discovered for obtaining it at will. It was always guarded with great care when once obtained. The Hebrews carried it carefully with them from place to place as the North American Indians were in the habit of doing before the early settlers of this country taught them the use of the flint and steel. Various methods for obtaining fire were discovered, and with the increasing knowledge gained by the experience of successive generations, these means have increased in simplicity and certainty until we have reached that of the modern match. Before the idea of using chemical mixtures for obtaining fire came to be practically applied, the chief device used was the flint and steel. By striking these together sharply a spark was elicited, which, being caught upon a bit of tinder, could be blown into a flame. This method was for a long time the

best in use. About the middle of the seventeenth century it was discovered that phosphorus by friction would ignite the end of a stick which had been dipped in sulphur. Phosphorus did not come into general use for more than one hundred and fifty years after this discovery; but during that time several modes of using it for that purpose were devised. There are many who remember the matches of fifty years ago. In 1829, an English chemist discovered by experiment that chlorate of potash would ignite by friction. At the suggestion of Professor Faraday, nitre or saltpeter was used in the place of chlorate of potash in order to avoid the explosion made by the ignition of this latter substance. The first patent in the United States for the invention of friction matches was granted to Alonzo D. Phillips, of Springfield, Mass., October 24, 1836. The chemical mixture used by him consisted of glue, phosphorus, chalk and sulphur; since that time the manufacture of matches has greatly increased and various patents have been granted for improved methods of manufacture.

SHOT.

Shot are generally made of lead with which arsenic has been mixed. The effect of the arsenic is to render the lead softer and more ductile instead of hard and brittle, so that when melted and subjected to the usual process in shot-making it will more readily take the globular form. The softer the lead the less arsenic is required. When the lead is properly combined with the arsenic it is formed into bars and raised to the top of a tower to be melted again and transformed into shot. The liquid lead in passing through the air becomes cool and hardens into leaden hail or shot. It is said that the method of shot-making originated with a plumber, of Bristol, named Watts. About the year 1782 he dreamed that he was exposed to a shower of rain, that the clouds rained lead instead of water. and that the drops of lead were perfectly round. He was so inspired by his dream that he determined to try the experiment. He ascended the tower of a church and poured some melted lead into some water below; the plan was successful, and he sold his invention for a large sum of money.

DYEING SEAL SKINS.

When the skins are received which is in the salt, and when washed they are placed upon a beam somewhat like a tanner's beam, removing the fat from the flesh-side with a beaming-knife, care being required that no cuts or uneven places are made in the pelt. The skins are next washed in water and placed upon the beam with the fur up, and the grease and water removed by the knife. The skins are then dried by moderate heat, being tacked out on frames to keep them smooth. After being fully dried, they are soaked in water and thoroughly cleansed with soap and water. In some cases they can be unhaired without this drying-process, and cleansed before drying. After the cleansing-process they pass to the picker, who dries the fur by stove-heat, the pelt being kept moist. When the fur is dry he places the skin on a beam, and while it is warm he removes the main coat of hair with a dull shoe-knife, grasping the hair with his thumb and knife, the thumb being protected by a rubber cob. The hair must be pulled out, not broken. After a portion is removed the skin must be again

warmed at the stove, the pelt being kept moist. When the outer hairs have been mostly removed, he uses a beaming knife to work out the finer hairs (which are shorter), and the remaining coarser hairs. It will be seen that great care must be used, as the skin is in that soft state that too much pressure of the knife would take the fur also; indeed, bare spots are made; carelessly-cured skins are sometimes worthless on this account. The skins are next dried, afterward dampened on the pelt side, and shaved to a fine, even surface. They are then stretched, worked and dried; afterward softened in a fulling-mill, or by treading them with the bare feet in a hogshead, one head being removed and the cask placed nearly upright, into which the workman gets with a few skins and some fine, hardwood sawdust to absorb the grease while he dances upon them to break them into leather. If the skins have been shaved thin, as required when finished, any defective spots or holes must now be mended, the skin smoothed and pasted with paper on the pelt-side, or two pasted together to protect the pelt in dyeing. The usual process in the United States is to leave the pelt sufficiently thick to pr ect them without pasting.

In dyeing, the liquid dye is put on with a brush, carefully covering the points of the standing fur. After lying folded, with the points touching each other, for some little time, the skins are hung up and dried. The dry dye is then removed, another coat applied, dried and removed, and so on until the required shade is obtained. One or two of these coats of dye are put on much heavier and pressed down to the roots of the fur, making what is called the ground. From eight to twelve coats are required to produce good color. The skins are then washed clean, the fur dried, the pelt moist. They are shaved down to the required thickness, dried, working them some while drying, then softened in a hogshead, and sometimes run in a revolving cylinder with fine sawdust to clean them. The English process does not have the washing after dyeing.

The above is a general process, but sometimes they are obliged to vary for different skins; those from various parts of the world require different treatment, and there is quite a difference in the skins from the Seal Islands of our country.

FURS.

The term fur includes the skins that are covered with an exceedingly soft and fine hair, except those which come under the class of wool. In the Northern regions, furs have always been highly esteemed on account of the warmth which they afford as articles of dress. Some of the most valuable kinds have been chiefly used to ornament the robes of persons of high rank, of which some are still visible in England in the state robes of the king and nobility. It does not appear, however, that furs constituted any part of the distinctive dress worn by the patrician orders of Greece and Rome; and the custom of wearing fur as an ornament is probably derived from the northern parts of Asia and Europe.

The Sable is an animal of the weasel family; inhabits the mountains of Siberia, and in the northern parts of Asiatic Russia it is found of the richest quality and darkest color. Large numbers of them are caught in this country in the territory of the Hudson Bay Co. The fur in summer is of a brownish color, which turns darker

in winter; in the latter condition it is highly valued, and is an important article of commerce to the Russians. The American sable, which is in great favor with the English, is sold in large quantities by the Hudson Bay Co.; the fur, however, is much coarser and less valuable than the Russian sable,—the price of which varies from $20 to $100 per skin. It may be distinguished from all other furs by the hairs turning and lying with equal ease in either direction. Dyed sables generally lose their gloss whether the hair has taken the dye or not, and the hairs are twisted or crimped; some smoke the skins. To detect dyeing or smoking, rub the fur with a moist linen cloth, which will then be blackened.

The Pine Marten is some better than the European, and is usually called Hudson Bay sable. It is an excellent and valuable fur, very full and soft; and like the Russian sable is much used for muffs, capes, collars, boas and other kinds of fancy furs. Its color is a lustrous brown, and is frequently tinted.

The fur of the Beech or Stone Marten is inferior to that of the Pine Marten. It is of a yellowish brown, and is often colored to represent the Pine Marten. The best specimens of the fur are obtained in Europe.

The Mink is found in almost every part of North America, also in portions of Europe and Asia. The fur which is of a fine brown color greatly resembles the sable. Contrary to the general rule it has been very fashionable for several years for muffs, collars, boas, trimmings, etc. The fur at one time was of very little value, bringing but fifty cents per skin; it is now considered a staple fur, the skins being worth from $1.50 to $7.00 each according to color and quality.

The American Mink is superior to all others; the best come from Canada and Maine.

The Ermine is a native of Russia and Siberia, where it abounds in large numbers. The fur in summer is of a reddish brown, which, however, changes to a pure white in winter; in this condition the fur was formerly very highly prized for the robes of the royal families of Europe and for the official dress of persons holding office of dignity. It has come into more general use within the last twenty or twenty-five years. One of the peculiarities of the Ermine is that the end of its tail remains black during the year.

The Seal is a native of the oceans of both the cold and the warmer regions, and is extensively caught off the coast of Labrador, Newfoundland, Alaska and the South Sea Islands. The fur has a beautiful down, which is covered with long, smooth and shining hairs; it is of different colors, from a brownish grey to a black, and sometimes variously spotted; it is usually dyed a fine deep brown. The best coloring and dressing is done in London; the success in producing fine coloring is probably due to the atmosphere, for the reason that although the identical workmen using the same chemicals and coloring matter in this country, fail to produce the same results: that is the same color that will remain for any length of time.

The finest Seal-skins are those of the South Sea Islands; the prices range from $15 to $75 per skin according to quality.

The Otter is found in almost the whole of North America; the fur is beautiful and of a fine dark color. It is exported in large quantities, and especially esteemed in Russia, where

it is worn almost universally. The fur greatly resembles that of the Beaver, only much finer. They are fierce, wild and shy in their habits, live much in water and feed upon fish. The fur is used mostly for caps, collars and gloves.

The Beaver is a native of British America, and to some extent of the northern districts of Europe. There are comparatively few caught in our latitude. Its fur is soft and close, and is of great value in the manufacture of caps and gloves, and large quantities are used in the manufacture of fine hats, both in the natural and dyed state. A superior variety comes from the coast of Labrador.

The Squirrel is widely distributed over the world and is very abundant in North America and Northern Asia; the small animal furnishes an enormous amount of fur, millions of squirrels being annually destroyed in Russia alone. The color is usually a fine grey, from the lightest to the very darkest shade. The fur which is most highly prized is that of the Siberian squirrel, and the fur as a general rule is softest in the varieties farthest north. The tails form a very common material for boas.

The Chinchilla is a native of South America, and is principally found in Peru and Chili. The fur is exceedingly soft and delicate, and of a beautiful silvery grey color. It is about the size of a squirrel; is extremely gentle and docile, and may be easily tamed and kept in the house.

The Grebe is a marine bird, and is common in the northern parts of both continents. It has a strait sharp beak, flattened toes, and very short wings. The legs are attached so far back that the birds when on land assume an erect position like penguins. They swim very rapidly. There are several species; the great Crested Grebe is rare even in winter, when the number is increased from the north. It is sometimes called Satin Grebe from the beautiful shining silvery feathers of the lower parts of its body, on account of which it is in great request; the skin being used to make muffs and collars and cut into strips for trimmings. The plumage varies at different ages and seasons.

The Fox is a native of North America, Asia and other countries. They are of all colors — white, grey, blue, iron grey, silver grey, red, variegated, and black; of these the last is the most valuable. The blue fox-skins are sought for, owing to their scarcity, and the black bring a high price from their justly acknowledged beauty. The silver fox is a rare animal, a native of the woody country below the falls of the Columbia River in North America. It has a long, deep lead-colored fur, intermingled with long hairs, invariably white at the top, forming bright lustrous silver grey; by some it is considered more beautiful than any other kind of fox; the skins vary in price from $15 to $50.

Nutria fur is obtained from an animal that inhabits South America. It resembles the Beaver in size and habits; in the workshops it is called the South American Monkey. It has long ruddy hair and a short brownish, ash-colored fur of considerable value, which has been largely exported to Europe for making hats. There are large quantities of it used in this country in the manufacture of hats and other purposes.

The Muskrat or Musquash is a native of North America. It is smaller than the Beaver, but in appearance and habits much the same. The number

of skins taken are enormous. They are mostly used in the manufacture of ladies furs. They are frequently dyed to imitate Mink, and are then called Alaska Mink; they are also plucked and dyed to imitate Mink, Seal and similar furs.

There is an insignificant animal called the Skunk, the skins of which have become very popular made up into ladies' furs and sold under the name of Black Marten; quantities are made into trimmings of various widths and sold to the ladies, which are used for trimming cloaks, sacks, jackets, etc. It is really very nice and fashionable, particularly when sold under some fancy name. The skins with the least amount of white command the highest price.

The Fitch or Polecat skins are produced throughout Europe; the ground of the fur is a rich yellow, while the top hair is jet black. It is one of the most durable furs worn, and there is scarcely any other fur that retains its natural color and looks so bright and fresh as long as the Fitch.

The principal fur markets of the world are Leipsic, St. Petersburg, Moscow, New York, and above all, London. The furs of the Hudson Bay Co. are sent to London where they are sold at auction in March and September. The great annual fair for the sale of furs takes place at Leipsic, and is attended by purchasers from all parts of the world.

HISTORY OF CARRIAGES.

The ancient litter was a kind of vehicle borne by men upon shafts; it was much used among the Romans, and Pliny calls it the traveler's chamber: the name *lectica* having probably been derived from *lectus*, a bed, there being usually a pillow and a quilt within. In the time of Tiberius these were in common use. The litter was also sometimes conveyed by horses, and the horse litter which was introduced into Rome from Bithynia, and for several reigns succeeding the Norman conquest were the only carriages employed in England for traveling by opulent persons; and this vehicle was used as a conveyance even long after the introduction of coaches as being the easiest, and giving the least fatigue of any then known. Previous to the invention of *wheels*, the *sledge* was no doubt long in use. In Madeira the the heavy pipes of wine are drawn on sledges from the mountain vineyards to the coast, and a person accompanies them to wet the bare rocks to diminish the friction. In Wales sledges are used to draw hay and corn. *Wheel carriages are of great antiquity*, being mentioned in the history of Joseph when among the Egyptians, as is shown by drawings from ancient representations of Egyptian chariots. The first wheels were probably solid cylinders, which would afterward be lightened by connecting together by a beam or axle, two slices cut off a tree, and two poles joined by cross-pieces laid upon this axle would form the simplest carriage. The next improvement would be rounding the axle and making the solid wheels revolve upon it, and a frame of wood-work with a handle to draw it by was probably the first carriage. The antique car used by the Egyptians and Greeks was equally simple; the wheels were small but perforated to give them lightness; the warrior standing in the carriage. The construction of the wheels in the present mode of naves, spokes and felloes was another advance towards perfection,

which not only admitted of their being of larger size but caused them to be more durable by using a metal band all round the circumference. The earliest mention of covered carriages in modern Europe was towards the end of the thirteenth century. The French *charrette* was a kind of ornamented and covered cart. It is mentioned by Chaucer as having been introduced into England and probably it had no springs. Hungary is the reputed birth-place of the proper coach and according to some, received its appellation from *Kotsee* a Hungarian village where it was first invented. In 1294 Philip the Fair forbade use of these vehicles to citizens' wives; and in the reign of Edward III of England, although they were not uncommon, it was long considered as effeminate to ride in a coach. About the beginning of the sixteenth century *coaches* became extremely numerous among the nobility on the continent, and frequently consisted of a carriage having pillars supporting a canopy with curtains, to which, ultimately, glass succeeded. Stowe informs us that coaches were not used in England till 1555, when the first was made for the Earl of Rutland; and in 1564 one was constructed for Queen Mary. Even in 1550 there were only three coaches to be found in Paris, then a distinguished city. The early coaches had no springs at all, as nearly as can be learned from such representation of them as survive. The leathern straps which are still used under stage-coach bodies, were the first contrivance of the kind. They are known to have been in use in the time of Louis XIV. From these lumbering old machines to the assortment of elegant forms and combinations of strength and lightness, which are to be found in the show-rooms of a first-class carriage maker of the present day, is a very long step. The good qualities of the present style of wheeled carriages are better shown in those of American makers than anywhere else, and the American vehicles are greatly admired abroad. Few of European make reach this country; when they do, their massive weight and clumsy structure present a striking contrast to the elastic strength, and slender though enduring fabric of any good American carriage maker.

BRICK.

Brick were probably used by the civilised nations of the east, from the earliest period; the Greeks brought the art of construction to perfection. The Romans practised the art of brick-making with the greatest success, and there is not a province of the Empire which does not exhibit proofs of the durability of their work in this material. The process of drying in the sun and burning in a kiln were employed by the Romans. Each were stamped with the mark of the maker, which generally consisted of the figure of a god or plant encircled by his name. Roman bricks were also scratched on the surface, and had lumps or notches cut in them for the purpose of making the mortar adhere more firmly than if they had been smooth. The first brick-kiln in New England of which there is any account was set up in Salem, Mass. in 1629; lime made from oyster shells was used before the deposits of limestone were found; bricks previous to this were imported from England; the last which were imported into Boston were used for building chimneys. The first brick house in Boston is said to have been built by

a Mr. Coddington; in 1643 a watch-house of brick was built in Plymouth, the bricks for it being furnished by a Mr. Grimes at eleven shillings per thousand. In New York bricks were early imported from Holland, and the style of houses was an imitation of those of Amsterdam. In 1630 at the first Court of Assistants held in Charlestown, Mass., the wages of carpenters, bricklayers, sawyers and thatchers, were fixed at two shillings a day, with a penalty of ten shillings to both giver and taker, if more was paid.

OLIVES.

The olive tree is interesting from historical recollections. It was the leaf of this tree, brought into the ark by the dove, that gave the first evidence of the waters of the deluge having abated. Since which time it has been employed as an emblem of peace. The olive was sacred to Minerva; it frequently appears in Grecian sculpture, and a wreath made of the leaves was a reward bestowed in the games of Athens. The Mount of Olives mentioned in Scripture proves it to have been a favorite tree in Palestine. The olive is indigenous in Syria, Greece and the North of Africa.

The *cultivated olive* was introduced into Italy by the Romans. It now grows there in great abundance, as likewise in Spain and the South of France, but the fruit will not ripen in countries farther to the North. It will grow in England, but though an evergreen in warmer climates, with us it loses its leaves in winter, and the fruit does not ripen in the open air. The *fruit* is smooth and oval: about three quarters of an inch in length, and half an inch in diameter, being about the size of a small plum. When ripe, it is of a deep violet color, whitish and fleshy within. It is rather bitter, and, to many, nauseous, but has its pulp replete with a bland oil, and with an oblong, pointed, rough nut in the interior. In Greece, and also in Portugal, the fruit is eaten in its ripe state, but its taste is not agreeable. They are prepared for food in two ways: one is simply to cut and soak in salt and water, adding a few herbs to give them a flavor; the other is to dry them in the sun, whereby they become black; they are then put into jars with oil, salt and pepper, or other spices, adding also a few herbs. When eaten, they are invariably flavored with oil and a little vinegar. The Italian shepherd often takes nothing to the field with him but a little bread, a flask of wine and a horn of olives. Fashion has done much in this country to introduce and create an acquired taste for green pickled olives at dessert. They are chiefly taken with a view to remove the taste of the viands from the mouth, previously to enjoying the taste of wine. Olives are chiefly cultivated for the oil which they produce. When the fruit is ripe it is put into a bag of rushes, and the oil is forced out by gentle pressure. The first oil is the best. A second quality is procured by a pressure sufficient to break the kernels. After the oil has been drawn, it deposits mucilage, and when sufficiently clear, it is put into clean flasks.

The greatest part of our best oil comes from Italy and is known by the names of Florence, Lucca and Gallipoli oil. Some is brought from Spain and the Grecian Islands. When quite fresh and pure it has very little taste or smell, and is quite transparent, having only a pale and greenish tint.

COMBS.

Combs are of great antiquity. The Egyptian, Greek and Roman combs were made of hard wood, usually box-wood, which was obtained from the shores of the Eusine; but later on ivory combs came into general use amongst the Romans as they had long before been used by the Egyptians. The gold combs of the middle ages worn as ornaments, or to support the hair, were frequently adorned with precious stones. The tortoise shell afterwards became an important article of commerce, especially in India and China. Fifteen or sixteen pounds of shell plates can be taken from a single turtle; when they are to be made into combs, they are softened by boiling and then cooled in metal moulds to any desirable shape. They are also made of ivory, horn, wood, bone, metal and india-rubber. Forty or fifty years ago tortoise shell combs with a very high back were much worn; the lace like work was very elaborate, and some of them were expensivc, costing thirty to fifty dollars a pair.

"OLD IRONSIDES."

The frigate *Constitution*, "Old Ironsides," as she was familiarly called, the most glorious and honored name on the list of our old navy, was built at Hart's ship-yard, in Boston, where Constitution Wharf now is, at a cost of over $300,000. She was made very strong. Her frame was of live oak, and her planks were bent on without steam, as it was thought that that process weakened and softened the wood. She was launched on the 21st of October, 1797, in the presence of a large gathering of people, but did not start upon a cruise till July, 1798, when she went to sea under command of Captain James Nicholson. The *Constitution* was so staunch a ship that she received the name of "Ironsides." She always had excellent commanders, and performed gallant service against the Algerine pirates and the British.

The *Constitution* was the flag-ship of Commodore Preble in 1804, when Tripoli was bombarded. In the gallant action of the 29th of August in that year she was run into within a short distance of the castle and the batteries, and by her destructive fire of round and grape shot silenced the guns of the fortification and spread devastation among the Bashaw's fleet.

The next great action in which the *Constitution* was engaged was the engagement with the British frigate *Guerriere*, of thirty-eight guns, commanded by Captain Dacres. It took place on the 19th of August, 1812, off the American coast, in the present track of ships to England. The *Constitution* carried forty-four guns, and was commanded by Captain Isaac Hull. After much manœuvering to obtain the weather-gauge, the hostile vessels at six o'clock in the evening came within half-pistol shot of each other, and engaged in a deadly conflict with the entire force of each vessel. The guns of the *Constitution* were double shotted with round and grape, and their execution was terrible. The rigging of the two vessels finally became entangled, and both parties prepared to board. The fire from small arms became exceedingly severe, and Lieutenant Morris, of the *Constitution*, endeavored to lash the vessels together. At this moment the sails of the *Constitution* filled, and she shot ahead, instantly exposing the shattered condition of her antagonist. The foremast of the *Guerriere* fell, carrying with it her mainmast. She

was thus left a helpless wreck upon a rough sea. The combat had continued for an hour, and the *Constitution* was about to pour a raking fire into her disabled antagonist, when the latter discharged a gun to the leeward, in token of surrender. At daylight the *Guerriere* was found to be sinking. The prisoners and some moveables were soon transferred to the *Constitution*, and at three o'clock in the afternoon, the battered hulk having been fired, she blew up. The *Constitution* carried the intelligence of her own triumph to Boston. Her next exploit, under the command of Commodore Bainbridge, was the capture of the *Java*, a British frigate of thirty-eight guns, commanded by Captain Lambert. This engagement took place on the 29th of December, 1812, off the coast of Brazil. The action lasted about three hours. The *Java* was entirely dismasted, a large number of her guns were disabled, and her hull was terribly shattered, and her bowsprit was shot away. The *Constitution* did not lose a spar. The *Java* was one of the best ships in the British service. Her officers and crew numbered over four-hundred; twenty-two were killed and a hundred and two wounded, her commander fatally. The *Constitution* lost nine killed and twenty-five wounded.

On the 20th of February, 1814, while on her way from Bermuda to Madeira on a cruise, the *Constitution*, then under command of Captain Charles Stewart, captured two important prizes, the *Cyane*, thirty-six guns, and the *Levant*, twenty. The action began about five o'clock in the afternoon. The evening was pleasant, the moon shining brightly. The British vessels manœuvered so as to attack the *Constitution* simultaneously. At half-cable's length they awaited their antagonist. She came up in gallant style, and managed so skillfully as to pour tremendous broadsides into both of them. A little before seven the *Cyane* surrendered. An hour later the *Constitution* started in pursuit of the *Levant*, which was endeavoring to escape, engaged her a quarter to nine o'clock, and after an hour's action compelled her to strike. The loss of the *Constitution* was three killed and twelve wounded; the two British vessels lost thirty-five killed and forty wounded.

During the long period of peace which preceded the outbreak of the Southern rebellion the *Constitution* was used as a school-ship at Annapolis, Maryland, whence she was removed temporarily to Newport, and was there employed in the same service.

The figure head of the *Constitution* was a carved wooden statue of General Jackson. It is now at the Philadelphia Navy-yard, but it is proposed to set it up in the Naval Academy grounds at Annapolis.—*Harpers.*

BARBERS.

In former times the barber's craft was dignified with the title of a profession, being enjoined with the art of surgery. The custom of cutting off the beard was introduced into Rome from the East; Plutarch says that the reason for shaving was that they might not be pulled by the beard in battle. In France the barber-surgeons were separated from the perruquiers, and incorporated as a distinct body in the reign of Louis XIV. There was a long strife between the barbers and surgeons; the former being ambitious to rise above their rank, and the latter desirous to exclude from chirurgical practices, persons who had not been

regularly educated. Their superior talent and learning gained for the surgeons the higher social position, but the barbers retained till near the time of the French revolution the exclusive privilege of using the lancet. The functions of the barber-surgeon comprised the cure of wounds, simple surgical operations and blood-letting, together with shaving and the cutting and dressing of hair, technically termed *trimming*. The barber shop in those days was a favorite resort of idle persons; and in addition to its attraction as a focus of news, a lute, viol, or some such musical instrument was always kept for the entertainment of waiting customers. The barber's sign consisted of a striped pole from which suspended a basin. The fillet round the pole indicated the ribbon for bandaging the arm in bleeding and the basin the vessel to receive the blood. The setting of fractured limbs was confined to a distinct class of persons called bone-setters.

THE COMPOSITION AND MANUFACTURE OF PORCELAIN TEETH.

The principal materials entering into the composition of mineral teeth are feldspar, silex, (flint) and kaolin, (clay), with various fluxes, so known in chemistry, more familiarly characterized as *glasses*, used to determine the point of fusion desired of different parts of the tooth. The general tone or tint of these materials is white or dusky yellow, so that coloring forms a prime adjunct in the process.

The chief coloring substances are titanium for yellow, platina sponge for gray, oxide of cobalt for bright blue, oxide of gold for red, which is used to produce the best appearance of gum. These, with others in varying combinations, are used to color the body, point and outside enamel. To form some idea of the immense variety of shades or grades of color capable of being produced, you have only to be told that there are more than forty shades of color in the bodies used, and an equal number in the *point and outside enamels.* Thus, starting with the lightest shade of body, known as "A," you may produce forty different grades by using a different point enamel, and on each of these a different effect by the use of various outside enamels, so that, with a single body of any one color, you may produce 64,000 varieties or gradations of color, and as there are thirty-nine other bodies, a smart calculator can determine the many changes of which they are capable.

It is not pretended, of course, that all these shades are produced, but some idea may be formed of the need of variety by the fact that out of innumerable trials in the way of combinations, one hundred and thirty standard shades are made, duly arranged and classified by members, forming a gradual, but quite perceptible progress, from the most delicate blue-white to the dark tobacco stain.

Realizing what would scarcely enter into the thoughts of one not experienced,—*i. e.*, the great diversity in color of the natural organs which these are made to imitate. We see that many teeth, good in themselves, have such an artificial appearance in the mouth, simply because the mechanical-dentist, (albeit an excellent mechanic,) has lacked the artistic perception to discover the shade and harmony of expression made necessary by the complexion, hair and eyes of the wearer, with all which Creative wisdom has made the natural organs to correspond.

The feldspar (found abundantly in the State of Delaware) is thrown in large masses into a furnace, and subjected to a red heat, then plunged into water, which renders it brittle and easily broken by the hammer into small pieces, so that all foreign matters, such as mica or iron, with which it may be mixed, can be separated. It is then mashed into a coarse powder, and subsequently ground under water, in a mill in which heavy blocks of French burr stones are pushed round on a nether mill-stone of same material, until it is an almost impalpable powder —so fine that it will remain suspended in water for a long time. The silex is subjected to the same process. The colors are long and patiently ground in a mortar and pestle machine, driven, as are the mills, by caloric engine power.

The materials, having been dried and sifted, are carried to the mixing room, where they are properly proportioned, and again ground in combination into the various mixtures desired. At this stage the body assumes the consistence and appearance of putty; the point enamel of a thick batter, and the outside and gum enamels of cream. The body is now ready for the molder's room. But we must first see how the molds are made. They are of brass, in two or more pieces, one-half the tooth being represented on either side. Great care is necessary in the construction of these molds, their cost varying form twenty to seventy-five dollars each. On them depend the shape and the style of the teeth. They must be anatomically correct, and mechanically perfect. It is not that Nature is introducing new styles of teeth as milliners their novelties, but continual approximation is being made to perfection, in imitating the endless minor differences in teeth, and in adapting them to new methods of adjustment to the plates to which they are to be affixed.

The teeth are supplied, each with two platinum-pins which bear a well formed head on the outer end of the pin; the end imbedded in the body of the tooth substance is bent at right angles. The strength, infusibility, and incorruptibility of platinum renders it peculiarly adapted for this use. The pins are manufactured by a spitefully busy little machine which is capable of turning out 1,500 per minute, and so adjustable that pins of various sizes may be made to suit various sized teeth.

In each tooth matrix there are two minute holes, which a workman, with rapid tweezers, is fitting with pins of the proper thickness and length, which are to form the future fastening of the tooth to the plate of gold, silver, celluloid or rubber. The mold is then passed to the next workman, who takes up, on a small steel spatula, the requisite amount of point enamel, and with this forms the cutting edge of the tooth, and passes the mold to his neighbor, who fills the matrix with body, then closes it. It is then passed by machinery and deposited in the drying oven. Carefully watched, it is taken out at the proper moment and emptied of its contents, which, tender and brittle, are laid on clay slides, and subsequently subjected to the process called biscuiting, which is done by bringing them to a cherry-red heat. The teeth are now like chalk, and can be cut and filed as desired.

From the biscuiting furnace the teeth are carried to the assorter's room, where they are arranged in sets, and after this the members of a set keep company all through their varied experience. This work is done by small boys, whose quickness of perception qualifies them for the work, and who

become so expert that they know every tooth, and the number of the mold from which it comes, as well as they know each other. Arranged in rows, they are smoothed and put in readiness for the enameler's room. The enamels are laid on with a brush, and the work requires delicacy and care, being usually done by the careful hands of ladies.

Having received their coats of enamel, the teeth are carried into another room to receive the gum enamel, which, when the fire shall have passed its verdict upon them, will reflect the rosy cheeks of the artists who laid it. But, taking up the line of march, they are again halted, that other light fingers, the owners of which are called finishing trimmers, may remove any surplus enamel from the sides, make true, with fine-pointed instruments, the arch of the gum, and lay the teeth carefully on beds of quartz sand in trays of fire-clay, ready for the fiery trial through which they are to pass, and without which they are unfit for life's work.

Beyond this no tool can follow them. Imperfections heretofore could have been repaired, but in the future beyond the fire, the tooth is either perfect or a failure, irremediable.

The furnace is an institution entitled to respect for its intensity. In its centre is a muffle of fire-clay, entirely surrounded by the glowing fuel, a charge of half a ton's weight or more, of coal, itself carefully bricked up before firing, that no impurities of dust or vapor shall reach the teeth. Take out the small half oval door of the muffle, and you shall feel a heat the eye shrinks from registering, an incandescence that startles you by its fervor. In from fifteen to thirty minutes, depending upon the state of the fire, the teeth, glowing like the oven, are taken out finished. The dull enamel has become a glass. The lusterless oxides have yielded their color, and the tooth that went in friable and brittle has come out adamant. But there is here required a skill, the acquisition of which is one of the marvels of the mechanical arts. It is trained judgment, a skill of the eye and handling, that enables the burner to give success to the work of those who have gone before him, and at the precise point where a shade of failure is utter ruin. A little too long in that heat, and the teeth are ruined; while the evils of *"underdone"* are to be guarded against equally with the housekeeper's baking.

The teeth are now done and ready for the curious characteristic red-wax cards on which they go into market.

THE INVENTION OF THE CARD-MAKING MACHINE.

While the card-setting machine does not rank among the most important of American discoveries and inventions, yet it is generally regarded as coming nearest in its movements to the acts of intelligence of any piece of mechanism that has ever been devised. Two delicate needles dart forward and punch the leather; a fork sweeps forward and sends the wire into a letter U; a pair of pincers seize the bent wire and thrust it deftly into the holes prepared for it; and finally a press rises on the opposite side of the leather, and bends the wire at the proper angle to make a perfect card. All of these varied movements go on automatically and continuously, and if a crooked or imperfect tooth is made, the machine instantly stops of its own accord. The card-setting machine was invented by Amos Whittemore, who was born at Cambridge, Mass., April 19th, 1759. His father was a farmer, but Amos

early showed a fondness for mechanical pursuits, and, on arriving at the proper age, became an apprentice to a gunsmith. Long before the expiration of his apprenticeship, his master confessed that he could teach him no more, and advised him to set up business for himself. Some years later, he became interested with his brother William and five others in the manufacture of cotton and wool cards, conducting their business in Boston, under the firm of Giles, Richards & Co., and supplying nearly all the cards then used in the country. Amos attended to the mechanical department. It soon occurred to him that if a machine could be devised to perform the operations, it would supersede a vast amount of hand labor, and would be of great value. After long and patient meditation, the plan had so far taken shape in his own mind, that he was ready to communicate his idea to his brother William. This brother encouraged and assisted him to the utmost, and a chamber was set apart for the construction of a model. Here the enthusiastic inventor devoted himself to the perfecting and embodying of his plans with such zeal as frequently to neglect his food and sleep. In the course of three months, the machine was so far advanced as to punch the leather, and to cut, bend and insert the wire; but the bending of the teeth at the proper angle, completely baffled his genius, and he began to despair of success. While his mind was on the stretch to overcome the obstacle, one night, during his sleep, the idea was presented to him in a dream. Rising early in the morning he hastened to his work-shop, and before he broke his fast he was able to announce to his brother that the machine was perfect. Steps were immediately taken to secure a patent, and this was obtained on the 2d of June, 1797. The brothers determined, also, a patent should be taken out in England, and that the inventor should visit that country for the purpose. At that time but two vessels traded between Boston and London, and in one of these, the *Minerva*, Mr. Whittemore sailed in the spring of 1799. He was absent a year, his return voyage occupying 59 days.

On the 3d of March, 1809, the patent was extended by a unanimous vote of Congress, for 14 years from the expiration of the first term. In after years he purchased a pleasant estate in West Cambridge and retired from active business. Here, after a pure and blameless life, he died in 1828, at the age of 69 years.

ORIGIN OF THE BAYONET.

The Bayonet is an arm peculiarly French. It was invented, it is said, at Bayonne, in 1641, and employed in 1670 in the regiment of the King's Fusiliers. It sensibly modified the system of military art in Europe, as it made cavalry less redoubtable to infantry, and caused the fire of lines of battle to cease to be regarded as the principal means of action.

The bayonet has, in fact, become the decisive arm of the combat. According to a local tradition, it was in a small hamlet in the environs of Bayonne, that this arm was invented. What led to the invention of it was that in a fierce combat between some Basque peasants and some Spanish smugglers, the former having exhausted their ammunition, and being thereby at a disadvantage, fastened their long knives to their muskets, and by means of the weapon

thus formed put their enemies to flight. This arm rapidly came into general use in Europe. After the King's regiment, several others were provided with the bayonet, and the dragoons received it in 1676. In 1678, at the time of the peace of Nimeguen, all the French grenadiers had the bayonet, but the socket which makes the use of it so easy was not invented until a later period. An unsuccessful experiment with the socket was made before Louis XIV, in 1688, but the want of uniformity in the muskets was then an obstacle to the adoption of this simple and efficacious piece of mechanism. Bayonets at that time were a sort of dagger of which the handle was placed in the muzzle of the musket, and of course prevented the musket from being fired. The first battle at which the bayonet was seriously employed, was that of Turin, in 1692; but it was not until the battle of Spires, in 1703, that the first charge of the bayonet was executed. After that epoch up to 1792, the bayonet was often employed in combat, but the value of it was not revealed until the wars of national independence.

THE FIRST CUT NAILS.

By the report of the Commissioner of Patents for 1852 we learn that the first cold cut nail in the world was made in America. This was done in 1777 by Jeremiah Wilkinson, of Cumberland, Rhode Island. During the revolution he followed the business of making cards by hand, and finding great difficulty in obtaining a supply of English tacks to nail them on, he tried the experiment of cutting some with a pair of large shears from the plate of an old chest lock, then heading them on a smith's vise. Finding this plan to succeed very well for his wants, he afterwards made all the tacks he wanted from sheets of iron. Subsequently he made larger nails, such as those used for fastening laths and shingles. This veteran inventor also made pins and darning needles of wire drawn by himself.

He was a Quaker and followed the peaceable trade of fighting iron while others of his countrymen were fighting their foes. He, however, did not labor in vain for his country, as he laid the foundation for vast improvements in cutting nails by machinery, which is exclusively an American invention.

HINGES.

Some contrivance in the way of a hinge, designed to facilitate the opening and closing of doors, was doubtless among the earliest mechanical inventions. The most primitive of all hinges was probably that formed by a strip of leather or untanned hide, secured to both door and door post, a simple arrangement still seen in common use. The correct idea of a hinge —a pivot or joint, upon which the door was supported and swung—seems to have originated with the Egyptians. They constructed doors which turned upon pins of wood or bronze, projecting from the upper and lower edges of the doors into sockets in the lintel and threshold.

The Greeks and Romans improved upon this formation by placing the upper pivot a little nearer the centre of the doorway than the lower one, thus giving the door, when opened to a right angle, for instance, a natural inclination to swing back and close itself. These ancient hinges were like the two ends of a spindle running through the length of the door; mod-

ern hinges resemble sections from the length of a spindle, not through the door, but between it and the door post, held to the one by a bolt which carries the pivot, and to the other by the eye which rides on the pivot. All the various modifications of this device embody the same fundamental elements —the pivot, the piece that carries it, and the piece that rides upon it.

During the middle ages much progress was made in the ornamentation of hinges by means of decorated attachments, worked into various graceful designs, but real improvements in the hinges themselves are of quite modern origin, the most valuable innovations in this line having been introduced within a very few years.

A great many contrivances, including slopes on the flanges of the hinge, weights, springs, pullies, torsion rods, rubber bands, etc. have been brought forward with the design of causing doors to close automatically, but all these have given way to the combination of a spiral spring with the hinge itself, a purely American invention, and one that seems destined to supersede all other methods of securing the desired object. It is called the Union Spring Hinge, and is a combination of a butt hinge and a coiled composition flat spring, so arranged with ratchet and pawl or pin, as to operate at any desired pressure, or it can be instantly disconnected so that the door will move as if hung upon ordinary hinges. The majority of springs are defective for the reason that the pressure lessens rapidly as the door approaches the closing point; in these the pressure is well maintained throughout. They are strong and elastic, not liable to break, and are not impaired by the action of frost or rust, as is apt to be the case with steel springs.

POTHOOKS.

In the last century, the original Crawshay, then a farmer's son, rode to London on his pony (his sole property) to seek his fortune. He began by sweeping out the warehouse of an iron-monger who was of a discriminating mind, and saw that young Crawshay had good stuff in him. The iron-monger had been speculating in sending out iron pots to America, and his astute apprentice observed that if the Americans used so many pots they must want hooks to hang them on. Whereupon his master not only took the hint, but kindly determined that Crawshay should send them out and that he would lend him the money for the purpose. Upon this venture five hundred dollars was realized, and from that time the farmer's son moved rapidly upward, being first taken into partnership by his master, and ultimately becoming an iron king in South Wales.

COPPER.

Copper appears to be more generally distributed throughout the world than almost any other metal. It is found in all the countries of Europe, in many parts of Asia, in Australia, the East Indies, South America, Cuba, Mexico and the United States. More than two centuries ago copper was mined and smelted in Massachusetts and New Jersey, and the existence of copper in the Lake Superior region was known at about the same period. The first settlers of this country found that many Indian tribes had weapons and ornaments made of copper, and the earliest colonial reports make mention of valuable copper discoveries in Maryland,

Virginia, North Carolina and South Carolina.

In 1709, a company was formed to work the copper mines in Simsbury, Conn., theirs being the first mining charter granted in this country. The Lake Superior mines were first worked to a very limited degree in 1771, but little was known of their absolute extent until a geological survey of the State of Michigan was made about 1825. Very little attention was paid to the matter, however, until 1844, when the "copper fever" commenced, and for four or five years raged with all the fury of an epidemic. Speculation ran wild and countless companies were formed, most of whose operations were confined to Wall street. The inevitable result followed; the paper companies exploded, and thousands were ruined. Soon afterwards Congress authorized the survey and sale of the mineral lands in the district, and about 1850 several companies with ample capital were chartered and the business of copper mining assumed a legitimate character.

The annual product from these mines is enormous and steadily increasing. A great deal of it is native metal, containing from seventy to eighty per cent. of pure copper, and occasionally some silver. It is estimated that the production of copper in the world has more than doubled within twenty-five years, and this increase is largely attributable to the discoveries in the Lake Superior region. Notwithstanding the extent of our own resources, however, the United States still import considerable copper ore from Cuba and Chili, pig and bar copper from South America, and sheathing copper from Great Britain.

The uses of copper are almost innumerable, its softness, tenacity and ductility adapting it to a great variety of purposes. It is rolled into sheets and plates, which are made into sheathing, boilers, stills and condensers for distilleries, vacuum pans for sugar refineries, and numerous domestic utensils. Copper rods are converted into bolts and wire, nails, tacks, etc. In combination with zinc it forms brass; with tin and other alloys it constitutes bronze, gun metal and bell metal. Pure copper is no longer used for coinage, being superseded by a compound of copper and nickel.

The process of tinning the copper is quite interesting. The sheets of metal are first washed, then immersed in an acid bath, to remove all foreign matter; again washed and scoured with fine sand, when they are ready to receive the coating of pure pig tin. The sheets are placed over a slow fire in brick furnaces, the tin in small pieces is sprinkled on the upper side, and as it melts is spread over the surface by rubbing with a piece of cloth. After another washing the sheets are planished upon cylindrical burnishing machines, operating by steam power. They are finally hammered by power and are then ready to be converted into boilers or the lining of bath tubs.

BEER.

The art of making a fermented drink from some kind of grain, appears to have been known at nearly all periods in the world's history, and among nearly all nations. Of all the cereals, barley is best adapted to the making of beer. And it is curious to notice

how early this experimental fact was discovered.

Herodotus, who wrote about 450 years B. C., states that the Egyptians made their *wine*, as he calls it, from barley because they had no vines. The Greeks also called their beer barley-wine. Dioscorides describes two kinds of beer made from barley. Tacitus states that in his time, beer was the common drink of the Germans, as it is at the present day. Pliny says that all the nations of the west of Europe make an intoxicating liquor of corn and water. The manner of making this liquor is sometimes different in Gaul, Spain and other countries, and is called by many various names; but its nature and properties are everywhere the same. Isidorus and Orosius describe the mode of manufacture adopted by the ancient Britons and other Celtic nations. The grain is steeped in water and made to germinate by which its spirits are excited and set at liberty; it is then dried and ground, after which it is infused in a certain quantity of water, which, being fermented, becomes a pleasant, warming, strengthening and intoxicating liquor. We learn from Beckmann that the first notice of the use of hops occurs in the beginning of the fourteenth century, when it appears that they began to be regularly employed in the breweries of the Netherlands. They were introduced into English brewing in imitation of the Flemings, and were first imported from the Netherlands in 1524. But though their efficacy was admitted in the conservation of beer, yet they were long supposed to contain qualities noxious to the constitution, among which it was said that they "dried up the body and caused melancholy." In the household regulations of Henry VIII was an order to the brewer not to put any hops into the ale. They are first mentioned in the English statute book, in 1552. In 1557 the national taste had somewhat changed in their favor. Their use was general in 1600, and their mode of cultivation was pointed out by Walter Blythe in the reign of James I. It is evident from this, that the beer of the previous periods had been very different from what it is at present. Soon after the introduction of hops into England, so little did they suit the general taste, and such was the public opinion respecting their deleterious qualities, that about 1650, the Common Council of the City of London petitioned Parliament against two nuisances: one of which was Newcastle coals and the other hops; as they spoiled the taste of drink and endangered the health of the people. Hops were also petitioned against in the reign of Henry VI, as a wicked weed, but the use of hops seems to have advanced gradually, partly from finding that it preserved the beer from turning acid, and partly from an habitual taste.

THE CAMPHOR STORM GLASS.

Dealers in philosophical and optical instruments sell simple storm glasses which are used for the purpose of indicating approaching storms. One of these consists of a glass tube about ten inches in length and three-fourths of an inch in diameter, filled with a liquid containing camphor, and having its mouth covered with a piece of bladder, perforated with a needle. A tall phial will answer the purpose nearly as well as a ten inch tube. The composition placed within the tube consists of two drachms of camphor, half a drachm of pure saltpetre, and half a drachm of the muriate of ammonia, pulverized

and mixed with about two ounces of proof spirits. The tube is usually suspended by a thread near a window, and the functions of its contents are as follows: If the atmosphere is dry and the weather promises to be settled, the solid parts of the camphor in the liquid contained in the tube will remain at the bottom, and the liquid above will be quite clear; but on the approach of a change to rain, the solid matter will gradually rise, and small crystalline stars will float about in the liquid. On the approach of high winds, the solid parts of the camphor will rise in the form of leaves and appear near the surface in a state resembling fermentation. These indications are sometimes manifested twenty-four hours before a storm breaks out! After some experience in observing the motions of the camphor matter in the tube, the magnitude of a coming storm may be estimated, also its direction, inasmuch as the particles lie closer together on that side of the tube that is opposite to that from which the coming storm will approach. The cause of some of these indications is as yet unknown; but the leading principle is the solubility of camphor in alcohol, and its insolubility in water, combined with the fact that the drier the atmosphere the more aqueous vapor does it take up, and *vice versa*.

HEAT OF DIFFERENT WOODS.

The following is set down as the relative heating values of different kinds of American wood. Shell-bark hickory, being taken as the highest standard, 100; pig-nut hickory, 95; white oak, 84; white ash, 77; dogwood, 75; scrub oak, 73; white hazel, 72; apple tree, 70; red oak, 69; white beech, 65; black walnut, 65; black birch, 62; yellow oak, 60; hard maple, 59; white elm, 58; red cedar, 56; wild cherry, 55; yellow pine, 54; chestnut, 52; yellow poplar, 52; butternut, 51; white birch, 48; white pine, 42. Some woods are softer and lighter than others; the harder and heavier having their fibers more densely packed together. But the same species of wood may vary in density, according to the condition of its growth. These woods which grow in forests or in rich, wet grounds, are less consolidated than such as stand in open fields, or grow slowly upon dry, barren soils. There are two stages in the burning of wood: in the first, the heat comes chiefly from flame, in the second, from red-hot coals. Soft woods are much more active in the first stage than hard, and hard woods more active in the second stage than soft. The soft woods burn with a voluminous flame and leave but little coal, while the hard woods produce less flame and yield a large mass of coal.

PAWNBROKERS.—ORIGIN OF THE THREE BALLS.

A nobleman in the town of Patara had three daughters, but was sunk in such poverty that he was not only unable to provide them with suitable marriage-portions, but was on the point of abandoning them to a sinful course of life, from inability to preserve them otherwise from starvation. St. Nicholas, who had inherited a large fortune and employed it in innumerable acts of charity, no sooner heard of this unfortunate family than he resolved to save it from the degradation with which it was threatened. As he proceeded secretly to the nobleman's house, at night, debating with himself

how he might best accomplish his object, the moon shone out from behind a cloud and showed him an open window into which he threw a purse of gold. This fell at the feet of the father of the maidens, and enabled him to portion his eldest daughter. A second nocturnal visit was paid to the house by the Saint, and a similar present bestowed, which procured a dowry for the second daughter of the nobleman. But the latter was now determined to discover his mysterious benefactor, and with that view set himself to watch. On St. Nicholas approaching and preparing to throw in a purse of money for the third daughter, the nobleman caught hold of the skirt of his robe, and threw himself at his feet, exclaiming: "O, Nicholas! Servant of God! why seek to hide thyself"? But the Saint made him promise that he would inform no one of this seasonable act of munificence. From this incident in his life, is derived apparently the practice formerly, if not still customary in various parts of the continent, of the elder members of a family, placing on the eve of St. Nicholas' Day, little presents, such as sweetmeats and similar gifts, in the shoes or hose of their younger relatives, who, on discovering them in the morning, are supposed to attribute them to the munificence of St. Nicholas. In convents the younger lady-boarders used, on the same occasion, to place silk stockings at the door of the apartment of the abbess, with a paper recommending themselves to Great St. Nicholas, of her chamber. The next morning they were summoned together to witness the results of the liberality of the Saint, who had bountifully filled the stockings with sweetmeats.

From the same instance of munificence recorded of St. Nicholas, he is often represented bearing three purses, or three gold balls; the latter emblem forming the well-known pawnbrokers' sign, which with considerable probability, has been traced to this origin. It is true, indeed, that this emblem is proximately derived from the Lombard merchants, who settled in England at an early period, and were the first to open establishments for the lending of money. The three golden balls were also the sign of the Medica family of Florence, who, by a successful career of merchandise and money-lending, raised themselves to the supreme power in their native State. But the same origin is traceable in both cases—the emblematic device of the charitable St. Nicholas.

THE FIRST PRAYER IN CONGRESS.

The "first prayer in Congress," was made by the Rev. Jacob Duch, of Philadelphia:

"O Lord, our heavenly father, high and mighty, King of kings, and Lord of lords, who does from thy throne behold all dwellers on earth, and reignest with powers supreme and uncontrolled over all kingdoms, empires and governments, look down in mercy, we beseech thee, on these American States who have fled to thee from the rod of the oppressor and thrown themselves on thy gracious protection, desiring to be henceforth only dependent on thee; to thee have they appealed for the righteousness of their cause; to thee do they now look for that support and countenance which thou alone canst give; take them, therefore, Heavenly Father, under thy nurturing care; give them wisdom in council and valor in the field; defeat the malicious designs of our

adversaries; convince them of the unrighteousness of their course; and if they still persist in their sanguinary purposes, O let the voice of thy unerring justice, sounding in their hearts, constrain them to drop the weapons of war from their unnerved hands in the day of battle.

Be thou present, O God of wisdom, and direct the councils of this honorable assembly; enable them to settle things on the best and surest foundation, that the scene of blood may be speedily closed; that order, harmony and peace may be restored; and truth, justice, religion prevail among the people. Preserve the health of their bodies and the vigor of their minds; shower down upon them and the millions they here represent, such temporal blessings as thou seest expedient for them in this world, and crown them with everlasting glory in the world to come. All this we ask in the name and merits of Jesus Christ thy Son and our Saviour. Amen.

CARD-PLAYING.

A universal Christmas custom of the olden time was playing at cards; persons who never touched a card at any other season of the year, felt bound to play a few games at Christmas. The practice had even the sanction of the law. A prohibitory statute of Henry VII's reign, forbade card-playing save during the Christmas holidays. Of course this prohibition extended only to persons of humble rank.

Palamedes, it is said, invented the game of chess to assuage the pangs of hunger during the siege of Troy.

Primero was the fashionable game at the court of England, during the Tudor dynasty. Shakspeare represented Henry VIII playing at it with the Duke of Suffolk; and Falstaff says: I never prospered since I foreswore myself at Primero. *Maw* was the favorite game of James I, who appears to have played at cards just as he played with affairs of state in an indolent manner; requiring in both cases some one to hold his cards, if not to prompt him what to play. *Noddy* was one of the old English court games, and there can be no doubt that the ancient Noddy was the modern Cribbage. *Whist:* all great inventions and discoveries are works of time, and Whist is no exception to the rule; the wonderful merits of this game were not early recognized. Under the vulgar appellations of Whisk and Swobbers, it long lingered in the servants' halls, ere it could ascend to the drawing-room. At length some gentlemen who met at the Crown coffee-house in Bedford Row, studied the game, gave it rules, established its principles, and then Edmund Hoyle, in 1743, blazoned forth its fame to all the world.

Edmund Hoyle.—Of this celebrated writer of treatises on games of chance, including among others, whist, piquet, quadrille, and backgammon, and whose name has become so familiar as to be immortalized in the well-known proverb: "According to Hoyle;" little more is known than that he appears to have been born in 1672, and died in Cavendish Square, London, on 29th of August, 1769, at the advanced age of ninety-seven. His treatise on *Whist*, for which he received from the publisher the sum of five thousand dollars, was first published in 1743, and attained such a popularity that it

ran through five editions in a year besides being extensively pirated.

He has even been called the inventor of the game of whist, but this is certainly a mistake, though there can be no doubt that it was indebted to him for being first treated of, and introduced to the public in a scientific manner.

THE OLD SHOE SALUTE.

A writer says: Very few, probably, of the thousands who throw old shoes after bridal parties as they are leaving home, know anything of the origin of the custom. Like almost all of our common customs, its origin is ancient, and can be traced to Bible times. It was then the custom for the brother of a childless man to marry his widow —or at least he had the refusal of her. If he chose to reject her, the ceremony was public, and consisted in her loosing his shoe from his foot, and spitting in his face. His giving up the shoe was a symbol of his abandoning all dominion over her, and her spitting in his face was an assertion of independence. There was an affair of this kind between Ruth and Boaz. In some parts of the East it was a custom to carry a slipper before a newly married couple as a token of the bride's subjection. The custom as it exists with us, is very old in England and Scotland. The usual saying is that it is thrown for luck, and that is the idea in this country, but originally it means a renunciation of authority over the bride by her parents. It was formerly a custom among the Germans for the bride, when she was conducted to her bed-chamber, to take off her shoe and throw it among the guests. Whoever got it in the struggle to obtain it, received it as an omen that either he or she would soon be happily married. Train, in his history of the "Isle of Man," says: "On the bridegroom leaving his house, it was customary to throw an old shoe after him, and in like manner an old shoe after the bride on leaving her home to proceed to church, in order to insure good luck to each respectively, and if by stratagem either of the bride's shoes could be taken off by any inspector on her way from church, it had to be ransomed by the bridegroom." In Kent, England, after a couple have started on their tour, the single ladies are drawn up in one row and the bachelors in another. An old shoe is then thrown as far as possible, and the ladies run for it, the successful one being supposed to be the first female who will get married. She then throws the shoe at the gentlemen, and the one who is hit by it, is deemed to be the first male who will enter into wedlock. Generally, it is considered, the older the shoe the better.

ANTIQUITY OF DIPHTHERIA.

The first record we have of diphtheria was of its ravages in Rome in A. D. 330. It was an epidemic in Holland, in 1336; in Paris, in 1576; in Naples, in 1618; and more extensively in France, in 1818 and 1835. It prevailed as a severe epidemic in England, in the years 1858, '59 and '60. The American Philosophical Society (Vol. 1) notices its first recorded appearance in this country in 1771, but it was not generally recognized then or for many years afterwards, being confounded with a membranous croup, putrid sore throat and other similar diseases. It was noticed here in the latter part of 1856.

HOW GLASS CHIMNEYS WERE INVENTED.

Argand, the inventor of the famous lamp which bears his name, had been experimenting for some time, in trying to increase the light, but to no purpose. On a table before him lay the broken neck of an oil flask. This he took up carelessly, and placed it almost without thought over the wick. A brilliant flame was the result, and the hint was not lost on the experimentalist, who proceeded to put his discovery into practical operation at once.

THE GOLD PREMIUM.

It is said to be a historical fact that the depreciation of our government currency below par in gold first commenced in 1862 in Columbus, Ohio, and not in Wall street, New York. There were many prominent citizens at that time profitably engaged in cotton speculation in the south. They found that coin answered their purpose much better than the government paper money, which the southerners were shy about taking. They began to purchase the gold that was held by the banks of Columbus, paying a premium of from three to five per cent. They next drew on New York for gold offering about the same premium and it began to excite the curiosity of the bankers there, and one person telegraphed to know why in thunder Columbus wanted so much gold. He was none the wiser when he received the reply to the effect that it was none of his business.

In 1861 Dec. 30th and 31st Specie payment was suspended.

On Monday, January 13th 1862 gold was quoted in New York at 1.03. The highest quotation during that year was Dec. 4th 1.34; the lowest for the year 1.01.

1863 the highest was Oct. 15th 1.56¾; the lowest Aug. 25th 1.22⅛.

1864 it reached the highest quotation during the war. Monday July 11th it opened at 2.76 and reached 2.85; and the average for that month was 2.59; the lowest during the year was January 6th 1.51½.

1865 the highest January 4th 2.33¾; the lowest May 11th 1.28½.

1866 the highest June 18th 1.67¾; lowest March 24th 1.25.

1867 the highest Sept. 12th 1.46⅜; the lowest January 3rd 1.32.

1868 the highest Aug. 6th 1.50; the lowest Nov. 5th 1.32⅛.

1869 the highest was Sept. 24 1.62½ which will ever be a memorable day, Black Friday as it was called; the lowest that day was 1.33. There were no quotations until the next Thursday and the lowest for the year was Dec. 30th 1.19½.

1870 the highest Jan. 10th 1.23¼; the lowest Nov. 4th 1,10.

1871 the highest Sept. 23rd 115⅜; the lowest Dec. 27th 1.08⅜.

1872 the highest Aug. 8th 1.15⅝; the lowest Jan. 11th 1.08½.

1873 the highest April 7th 1.19⅛; the lowest Nov. 8th 1.06⅛.

1874 the highest April 15th 1.14⅜; the lowest July 29th 1.09.

1875 the highest Oct. 15th 1.17⅝; the lowest July 23rd 1.11¾.

1876 the highest March 3rd 1.15; the lowest was in Dec. 1.07.

1877 the highest April 17th 1.07⅛; the lowest was in Oct., Nov. and Dec., which times it was 1.02½.

1878 the highest Jan. 2nd 1.02⅞; the lowest and last quotation was ⅛ on Tuesday Dec. 17th.

The greatest fluctuation in any one day during the 16 years was Sept. 24th 1869; the lowest 1.33 and the highest 1 62½.

GUNS.

Hand guns, or small fire arms, appear to have been introduced in 1471, when Edward IV, landing at Ravenspur in Yorkshire, brought with him, among other forces, 300 Flemings armed with hand guns. After this they became common. At first they were fired by the application by hand, of a lighted match. This was improved by the invention of the match-lock, a contrivance suggested by the trigger of the cross-bow to convey, with certainty and instantaneous motion, the burning match to the pan. The match-lock was superseded by the *wheel-lock*, a small apparatus for exciting sparks of fire by the friction of a furrowed wheel of steel, against a piece of sulphuret of iron. The fourth great improvement was the *flint-lock* which continued from the time of Elizabeth to the present century, when the inventor of the *percussion-lock* superseded all other forms. The introduction of percussion caps, led also to the necessity of altering the breeching of the guns. The breeching or plug of a gun, was formerly a solid lump of iron, screwed into the barrel close to one end. Long before the introduction of percussion caps, it was a matter of complaint that these guns fired very slowly, and that considerable portion of the powder was blown out uninflamed, so that the force was lost. A great improvement was made by Nock, in 1787, who introduced a form of breeching which caused the powder to be ignited in the centre. This breeching continued in use for fifty years without any real improvement, but when percussion caps came into use, there was a complaint that they did not shoot so strong; this led to the invention of other forms of breeching, many of which are now in use. The breech-loading system, although of very ancient origin, has been regarded with much doubt in this country, and even in its modern improved form, great reluctance has been shown to generally adopt it. This slowness of recognition and want of confidence may be said to be mainly owing to the adverse opinions entertained regarding it by both sportsmen and gun-makers. On the Continent, matters were somewhat different, and the breech-loader achieved for itself a good reputation. It was, however, but little known in England until the Exhibition of 1851, when specimens of breech-loading arms were submitted by French gun-makers but the weapons were not favorably received for many years after. Mr. Lang, the well known gun-maker, claims the merit of having introduced the new system to the notice of British sportsmen. To Mr. Lefaucheux is due the honor of inventing the modern breech-loading sporting gun; although a practically useful weapon when first introduced by him, the action was weak and imperfectly developed. But his great achievement was the introduction of a shell or cartridge case, which should fit the breech of the gun. The shell or case, by expanding at the moment of discharge, effectually closed the breech joint and prevented the escape of the gas.

Conditions, such as these, had not been brought about before M. Lefaucheux's discovery, by the combined ingenuity of his predecessors. The happy idea of making the cartridge contain its own ignition, greatly contributed to the success of the invention. Lefaucheux's first gun had but a single grip and this was about one inch from the hinge-pin, leaving that part unsecured that received the greatest

force of the explosion, which is close to the breech. The result of this was that the breech sprang up a little every time the gun was discharged, and consequently made the barrels droop at the muzzle, besides causing a great escape of gas through the pin-hole. This great defect was soon seen by English gun-makers, and improvements followed.

The best foreign breech-loaders are considered to be those manufactured by James Purdey, William Pape, Westley Richards, W. W. Greener, W. E. Scott & Son. The leading manufacturers in America are Remington & Sons, Parker and Whitney. Their goods have a world-wide reputation.

PISTOLS.

The pistol was introduced about the reign of Henry VIII and was known as the "petronel." The name is derived from the city of Pistola Perugea in the Romagna. Many specimens of the ancient revolver are to be found in the Museum of Paris and elsewhere. The inefficiency of these revolvers was not so much owing to the fault of the mechanism as to the mode of ignition; the flint-and-steel or match lock was ill adapted for this kind of weapon.

The revolver was again revived when percussion caps came into use. Colonel Colt was the first to produce a truly reliable revolver which was adopted universally by the American, and afterwards by the English Government.

M. Lefaucheux has the credit of bringing out the first breech-loading revolver. The first specimens of the Lefaucheux pin cartridge case were made of paper with metal bases similar to the gun cartridges. The next improvement was the solid metal case with a bullet fixed in it making it waterproof.

PERCUSSION CAPS.

Considerable doubt exists as to who was the inventor of percussion caps in their present simple and effective form. It appears that in the year 1807, the Rev. Mr. Forsyth obtained a patent for the use of fulminating powder in firing artillery. The powder employed by him consisted of chlorate of potash, sulphur and charcoal; and the apparatus for using it consisted of a magazine turning on a roller or tube screwed into the breeching of the gun. A small portion of fulminating powder being deposited in the roller, the magazine was restored to its firing position and the cock struck on a pin with a spiral spring attached to it which inflamed the gunpowder. This contrivance passed through a variety of forms before the percussion cap was invented. According to Mr. Wilkinson, this invention was purchased by Mr. Egg from Mr. Roantree, a gun-maker at Barnard Castle, Durham, who had it from a workman employed by Joseph Shaw, an English landscape painter, afterwards resident in America. Mr. Shaw assured Mr. Wilkinson that in 1814 he invented a steel cap which when fired, was retained to be primed again; in 1815 he invented a pewter cap which was thrown away after using; and in 1816 the copper cap similar to that now in use. Percussion caps are produced by pressure; the blanks are punched out of thin rolled copper in the form of a cross with short equal arms, or with only three arms, and the blanks having been annealed, are formed into caps by means of dies, which fold up the arms and unite them into a short tube, while the central part of the metal, which forms the top of the cap, sustains the blow of the hammer. The bottom of the cap is touched with a solution of

gum or glue into which the fulminating powder is dropped. Caps are sometimes varnished to prevent them from losing their power by exposure to damp.

LAMINATED STEEL.

Many years ago W. Greener brought out the laminated steel as the very best and most suitable metal for gun-barrels.

At first many gun-makers ridiculed the idea of using such a hard metal but they soon changed their opinion and the laminated steel has now a world-wide reputation. Laminated steel is made in the following manner. Having collected a sufficiency of mild steel scraps, such as cuttings of saws waste from steel pen-making old coach springs and the immense variety of pieces arising from the various manufactures of tools; they are cut into pieces of equal dimensions, polished in a revolving drum by their friction against each other, until quite bright, and then placed for fusion on the bed of an air furnace. The parts first fused are gathered on the end of a similarly fabricated rod in a welding state, and these gather together by their adhesion the remainder as they become sufficiently heated until the bloom is complete. The steel is then removed from the furnace and undergoes the effect of a three-ton forge hammer and the tilt until it forms a large square bar; it is then re-heated and conveyed to the rolling mill where eventually it is reduced to the size of rod desired. The metal is usually cut into pieces of six inches in length and a certain number are bundled together welded, and then drawn down again in the rolling mill. This can be repeated any number of times, elongating the fibres and multiplying their number to an indefinite extent as may be required.

There is another process of making laminated steel which is univsrsally used by gun-makers and which is called the modern plan. A long strip of mild steel of the thickness required, then a bar of superior iron the same size and another of steel and so on to the number of twelve, laying them upon each other alternately. The whole are then welded together and drawn through rolls which reduces the size to three or five eights of an inch as required and into square bars. In this form it is supplied to the barrel welder who works it up into the barrel. When about to be converted into damascus, the rod is heated the whole length and the two square ends put into the heads (one of which is a fixture,) of a kind of lathe which is worked by a handle similar to that of a winch. It is then twisted like a rope until it has from twelve to fourteen complete turns in the inch. By this severe twisting the rod of six feet is shortened to three, doubled in thickness and made perfectly round. Two of these rods are placed together with the inclinations of the twist running in opposite directions. They are then welded into one and rolled into a rod eleven sixteenths of an inch in breadth. This rod is twisted into a spiral tube by attaching one end to a mandrill which is turned round by a handle until the whole strip is coiled. It is usual to make a gun-barrel in two parts; the breech is made of thicker strips than the muzzle. Spirals that are intended for the breech-end are heated to a welding heat for about three inches, removed from the fire and jumped close by striking the end against the anvil. Again they are heated and jumped to insure perfect welding. The neatest part of the process consists in joining the points of the two rods so as to make the

barrel appear as if it had been twisted out of one rod. The ends of the two rods are a little detached brought from the fire applied to each other; a gentle tap is then given and the union is perfect in an instant. This trouble is only taken in the best barrels. In the manufacture of barrels of an inferior description, the ends of the rods are cut in a sloping direction, and when welded together, become quite square at the part where the pieces are joined. In a finished barrel, the points of junction are easily recognized. By tracing the twist, a confusion will be found to exist for about an eighth of an inch, every six or seven inches. Then follows hammer-hardening — that is, beating the barrel in a comparatively cold state in a groove with light hammers. This closes the pores, condenses the texture of the metal, compresses a greater substance into less bounds, increases greatly the strength of the barrel and renders it more elastic.

English damascus is made much in the same way as the laminated steel just described. It contains nearly as much steel and is almost as hard; but the strips or bars of iron and steel are arranged so that the figure may be more clearly defined. The light parts are steel and the dark the iron. The curly figure is obtained by twisting the rods. Damascus has three rods which form the strip to make the barrels; this causes the figure to be finer. Laminated steel has but two rods. Belgian damascus barrels are used extensively in England by nearly all the gun-makers; but in this country they are considered inferior to the English make, being too soft for really good gun-barrels.

Turkeys and chocolate introduced into England from America in 1529.

HISTORY OF THE AMERICAN PATENT OFFICE.

By Act of Congress in April, 1790, entitled an act to promote the progress of useful arts, the Secretary of State had assigned to him the duty of receiving applications for the discovery of any useful art or invention; said officer, with the Secretary of War and the Attorney General, constituting a Board for that purpose, who issued the "letters," which, upon examination by the Attorney General of the United States within a given period, were signed by the President of the United States. To a single clerk in the Department of State, then held in Philadelphia, was assigned the duty of filing papers and copying schedules of patents. The destruction by fire of the public archives in 1814, renders it difficult to give his name. The act of February 21, 1803, repeals that of 1790, yet all patents issued under the former act were valid, and the labors of preparation of the "letters" were assigned to the Department of State, under charge of a clerk. In 1800, when the seat of government was removed to Washington from Philadelphia, a distinguished man of genius, a fine writer and scholar, and a great lover of the fine arts, Dr. William Thornton, was appointed the clerk. He was born on the island of Tortola, in the West Indies and was of American descent. He enjoyed the confidence of General Washington, and his design of the east front of the original capitol was adopted by the great chief. Dr. Thornton was an intimate friend of John Fitch and Robert Fulton of steam notoriety. The doctor was wealthy and fond of fine horses. He was one of the original commissioners of the city, and General Washington had a

great regard for him. The Patent Office was then located in a large three-story building, known as Blodgett's Hotel, which was in a part of the second story, and the mail department filled the remainder. In the northwest room was a fine musical instrument of Dr. Thornton's. The old Blodgett Hotel stood upon the site of the present south front of the General Post Office. When the British, in 1814, proposed burning the building, Dr. Thornton, in the most fearless, yet gentlemanly manner, rode up to Admiral Cockburn and ejaculated, "Is the character of the British to rival the Vandals in a war upon the fine arts by the destruction of this building," which he then first called "the Patent Office." (It had been known as Blodgett's Hotel.) The effect was electric, for while the capitol and navy-yard and rope walk were in flames, the British sailor rode off and quaffed his wine in Capitol Hall, at no time expressing any regret that Thornton's toy-shop was left standing. This building was afterward occupied, in the winter of 1814–15, by both Houses of Congress, when the Patent Office writing was done at the house of the clerk, George Lyon, who resided near by. It was re-occupied in 1816 by the Patent Office, Congress having secured accommodations in the Brick Capitol. George Lyon, clerk in the Patent Office, died in 1817, and William Elliot was appointed first clerk under Dr. Thornton, known as Superintendent. Dr. Thornton died in 1827 and was buried in the Congressional Burying Ground, and he and his friend Elliot, mathematician and astronomer, lie within a few yards of each other. Thornton and Elliot were assisted by another clerk, R. W. Fenwick, and this constituted almost the entire force of the establishment. In 1828, Thos. P. Jones was appointed to the Superintendency, and he was succeeded in 1830 by Dr. J. D. Craig, who remained in office till 1836. On July 4, 1836, a law was passed entirely remodelling the Office and repealing the former acts. The law provided for a Commissioner, Chief Clerk, an Examiner and three other clerks, one of whom must be a competent draughtsman and a machinist. On the 15th of December, 1836, fire was discovered in the building occupied by the Patent Office and Post Office. Amos Kendall, Postmaster-General, with some assistance was enabled to save records and documents from the Post Office, but so rapid were the flames, that nothing was saved from the Patent Office. The destruction of models, drawings and records, embraced the whole history of American inventions for half a century. The first Commissioner was Henry L. Ellsworth, whose date of appointment was July 4, 1836. He devoted himself with industry and ability to the organization of the Office. He remained in office seven years, and was succeeded by Edmund Burke, May 4, 1845, who bestowed much labor on the Office. Thomas Ewbank succeeded Burke, May 19th, 1849, his reports evinced industry and ability. His successor was Silas H. Hodges, who was appointed, Nov. 8th, 1852, by President Fillmore. He remained, however, but a short time in office. Hon. Charles Mason, of Iowa, was the next Commissioner who was appointed, May 16th, 1853. He was particularly adapted to the position and brought to the Office eminent acquirements and ability. He graduated at the head of his class at West Point, and served in the army for a short time, since which he has led a legal and scientific life. He was

Judge of the Supreme Court of Iowa in early days; and has devoted the best energies of his life to the cause of science. He was especially fitted for the duties of the Patent Office, and is still remembered among scientific men as one of the most capable officers, which that Department has ever had. He was succeeded by Hon. Joseph Holt, Sept. 10th, 1857, who was a most popular and able commissioner. Mr. Holt was succeeded by Hon. Wm. D. Bishop, of Connecticut, May 22, 1859, who discharged the duties for a brief period with ability. Ex-Governor Thomas, of Maryland, who was appointed, Feb. 16, 1860, was Mr. Bishop's successor. Upon the election of Abraham Lincoln, Hon. D. P. Holloway, of Indiana, was appointed commissioner, March 28th, 1861, and held the office upwards of four years. Mr. Holloway was succeeded by Hon. Thomas C. Theaker, of Ohio, Aug. 17th, 1865, who worthily filled the position. He was succeeded by Elisha Foote, of New York, who was appointed, July 29th, 1868, and he remained but a short time, and was succeeded by Samuel S. Fisher, of Ohio, April 26, 1869. The next appointment was M. D. Leggett, of Ohio, January 30th, 1871. His successor was J. M. Thatcher, of Mass., whose date of appointment was, Nov. 30th, 1874. He was succeeded by the present incumbent, R. H. Duell, of New York, who was appointed, Oct. 1st, 1875. He was succeeded by Ellis Spear, of Maine, whose date of appointment was January 30, 1877. Halbert E. Paine, of Wisconsin, was next appointed, November 1, 1878. He was succeeded by Edgar M. Marble, of Michigan, whose date of appointment was March 7, 1880. Next was Benjamin Butterworth, of Ohio, October 26, 1883, followed by Martin Montgomery, of Michigan, March 21, 1885. He was succeeded by Hon. Benton J. Hall, of Iowa, who discharged the duties with signal ability. Date of appointment April 7, 1887. Next was Charles G. Mitchell, of Connecticut. Date of appointment April 1, 1889.

The first patent was issued in July, 1790, and to 1800 averaged 91. In 1820 it reached 200, and in 1830 it was 535.

SHORT-HAND.

Pythagoras is the earliest reputed inventor of short-hand. He lived about B. C. 555. Xenophon (B. C. 424) and Ennius the Latin poet (B. C. 239) are also said to have invented it. It is pretty certain that Cicero practiced it, if he did not invent it, and that he taught it to his freedman and secretary, Tyro, who is said to have taken down in short-hand the oration against Catiline. These inventions, whether real or not, it should be noticed, are dated in periods of intellectual activity. During the Dark Ages short-hand slept. When the minds of men awoke again, it promptly woke with them, and a system was published one year before the discovery of America, which is said to be the oldest now actually extant. The chief mental activity of those days was theological; and accordingly the practice of short-hand increased with Protestantism, and especially with that form of it distinguished for the boldest and most indefatigable mental activity, namely Puritanism. This religious belief flourished chiefly in England from the time of Edward VI to that of Charles II, and it is accordingly in that country and within that period, that the chief earlier English systems

were invented. Bright's appeared in 1588, and is called the first English work on the subject; Bales' in 1590; Willis's in 1602, etc. The Puritans had among them indefatigable "verbatim reporters" of sermons, and many of their ministers and students habitually used short-hand for extensive memoranda, notes, and even full drafts, of all sorts of theological composition. It is well known that the famous book of Pepys, an admirality official under Charles II, was left by him in short-hand and that it had to be deciphered and written out before printing. There is a curious illustration of the pedantic manners of these times, in the names chosen by different virtuosos for their systems. We find, besides the common name of stenography, the following: Characterie, Brackygraphy, Tachygraphy, Semigraphy, Cryptography, Bodiography, Teiglography, Pelography, Leitography, Radiography, Thorography; and finally Mr. Samuel Soare, in 1780, *soared* above them all with the terrific double-fortified polysyllable, Tachybrachygraphy.

In our own older historical libraries are still packed up in dark corners, or laid under glass, as mere curiosities, considerable portions of the theological and other short-hand MSS, left by the colonial Puritan clergy of the seventeenth century; and curious and valuable historical and biographical information has more than once been extracted from their absolute strokes and hooks and curves.

Other systems of short-hand have appeared every few years ever since those times, of which Gurney's was one of the best known. It was not, however until the year 1837 that a system of short-hand was put forth which was securely founded on a true philosophy of language; which corresponded in its construction to the real elements of English; and which was capable of becoming at once a correct, systematic, clear and rapid record of the spoken words. This system was Phonography, invented by Isaac Pitman. After thirty-eight years of constant and ardent labor this has become the accepted system of English short-hand and is used in its department, almost as much of course as is the English printed alphabet in public and private. A considerable number of periodicals, manuals, and other works relating to it have appeared in the United States; for the characteristic quickness and thoroughly practical tendency of the American mind have found in Phonography a most congenial study.

Among the most important text-books of Phonography, published in this country, are those of Benn Pitman, a brother of the inventor of the system, who immigrated to this country from England, and settled in Cincinnati; Graham, of New York; Lindsley, of Mendon, Mass.; Marsh, of San Francisco; and, though the latest, the best, Munson, of New York. Within a few years, Mr. James E. Munson, of New York, a talented law reporter, has introduced some important changes in Phonography and has brought out a new text-book called "The Complete Phonographer," which is certainly the finest book of the kind ever published. In respect to the philosophic arrangement of principles, the working out of details, and mechanical execution, it is wholly admirable. A good text-book is of much importance to the learner, and a system not the best, might be perused with more advantage than a better one, if the text-books of a former system are very much superior to those explaining the latter. Whatever system be taken up, it would

be well for the learner to have Mr. Munson's book at hand, since it contains a larger and better classification of the words of the language than is to be found elsewhere. Mr. Munson's method has been very favorably received, and is probably the best form of Phonography extant, for the use of short-hand reporters. At present, the number of reporters practicing each, the Pitman, the Graham and the Munson, the three leading styles of Phonography in the United States, is about equal.

The business of short-hand reporting is generally of a permanent character, and quite as honorable and respectable as any other. Indeed a first-class stenographer who once establishes a business is pretty sure to have a national reputation, and to be called from time to time to various parts of the country on special occasions when the services of a responsible man are wanted. The offlcial stenographers in Paris are said to hold a very good social position and the same thing is true in London, where the Parliament reporters are almost a part of the government, and in this country where more find employment than in any other part of the world. Other professions may offer larger and frequently more splendid rewards but in no other profession are the rewards more sure or more honestly earned. Other professions are infested by quacks and hypocrites, and shysters, but among short-hand writers there is no room for pretension and sham; only the skillful and competent can prosper.

For the last ten or twelve years the demand for stenographic writers has been steadily increasing in advance of the supply. Many people suppose that most of the short-hand work is done for the newspapers, but this is a mistake. It has been principally in connection with the courts of law that stenographers have earned reputation and money. Judges, lawyers and litigants, all require their service, and are willing to pay liberally for it. Many phonographers of limited experience are employed as amanuenses in places of public business, such as the custom houses, etc., in large cities, and in the departments at Washington. Many more are engaged in law, insurance and banking offices and as private secretaries.

A few statistics may be interesting. The Superior, Supreme, Common Pleas, Marine and Surrogate's Courts of New York City employ altogether fourteen official stenographers at salaries of $2, 500 or 3,000 each. An act has recently been passed empowering the six or seven District Courts to supply themselves with like assistants, and pay a salary of $2,000 to each stenographer. In the eighth Judicial District Courts of the State of New York, and in the Courts of Maine, Illinois, Iowa, Michigan, Nebraska, Pennsylvania, California, and probably other States, official stenographers are employed. This system has recently been adopted in the Courts of South Carolina, and will no doubt soon be in every State in the Union. The certainty afforded in disputed points by reference to the notes of a competent short-hand writer, who takes down not what might have been said, but what really was said, is an invaluable aid to the administration of law and justice, aside from the great saving of time in the majority of trials. Other departments of short-hand work are equally well paid. Twenty-five cents a folio (100 words) is charged in New York for reporting and furnishing copy of testimony, or the speech of counsel, or any one else on an important matter. Five dollars is charged for

attendance at any reference case, no matter how short. Not less than $10 is paid to any first-class reporter for a day or night's work, and most frequently $20. Dictation work, of which there is a large quantity done by younger phonographers, is paid six cents a folio, and the same price is paid for writing out from original notes. From $20 to $30 per week can easily be made in the busy season, at this work alone, by those who can write their notes readily, and translate them into legible, well-spelled long hand. Salaried amanuenses receive from $20 to $35 per week, according to capacity.

The system of short-hand reporting in the United States Senate, it is said, has become by long years of training, entirely uniform, so that each reporter can read the notes of the others with perfect ease. This is probably not true of many other bands of short-hand writers in the country. Every short-hand writer may be taught the same general system of writing, but the practice of his profession introduces so many personal peculiarities of the writers abbreviations known only to himself that it is a generally admitted fact that the average short-hand writer cannot accurately read the writing of any of his associates. The Senate system has for years constantly weeded out anything of personal peculiarity, and has maintained a strict adherence to the Pitman system, in such accuracy of detail that the copy of the one is always open print to any of the others. We know, however, of one other instance, in which several reporters of the Munson System transcribe each others notes with accuracy and ease.

In the House there are five reporters who receive a salary of $5,000 a year for their work. They each have a separate system of writing and could no more read each others notes than they could translate the hieroglyphics recently discovered in Arizona by the Hayden Expedition. They work independently of each other, turns of twenty minutes each, and have no authorized chief.

There is the most intense rivalry between the staffs of the Senate and the House, and each is convinced that his side of the Capitol is the hardest to care for. The Senate reporters claim that the conversational tone employed in the Senate is the hardest to follow, while the House reporters claim that the noise and scenes of confusion over there so complicate matters that none but the highest order of reportorial talent could meet with any success.

Charles Dickens, who was himself a short-hand reporter before he became a famous author, has given us in "DAVID COPPERFIELD," an amusing description of his hero's difficulties in mastering short-hand; in which description, it is generally believed, he had his own experience in view. For the encouragement of young men and women who may desire to acquire this useful and beautiful art, we will say that since Dickens learned it, such improvements have been made in the art, that any one with average intellect and perseverance may acquire it.

INTERESTING FACTS.

The first decked vessel ever built within the limits of the old United States, was constructed on the banks of the Hudson, by Adrian Block, in the summer, 1614. She was called a yacht, and her first voyage was made through Hell Gate, into the Sound, and as far east as Cape Cod, by the Vineyard passage. It was in this voyage that Block Island was discovered. Within

the first 46 years after the settlement of Massachusetts, there were built in Boston and its vicinity, 730 vessels, varying from 6 to 250 tons in burden. One of these, the Blessing of the Bay, a bark of 50 tons was built in 1631. The celebrated English patriot and divine, Hugh Peters, caused a vessel of 300 tons to be constructed at Salem, in 1641. The first schooner ever launched is said to have been built at Cape Ann, in 1714. In 1713, Connecticut had but 2 brigs and 20 sloops, and a few smaller craft, employing but 120 seamen: while Massachusetts, about the same time, had 462 vessels, the tonnage of which was 25,506, and employing 3,463 seamen.

The first ensign ever shown by a regular American man-of-war, was hoisted on board the frigate Alfred, in the Delaware, by the hands of Paul Jones, in the latter part of December, 1775. What this ensign was, is not precisely known, as the present national colours were not formally adopted until 1777. The first regular American cruiser that went to sea, was the Lexington, a little brig of fourteen guns, commanded by Captain John Barry, of Philadelphia. She sailed some time in the winter of 1775. The first American man-of-war that got to sea after the adoption of our present form of Government, was the Ganges. She was originally an Indiaman, but was purchased by the Government and converted into a cruiser, having an armament of 24 guns. She sailed in May, 1798, under the command of Captain Richard Dale, who was first Lieutenant of the Bon Homme Richard, when that ship captured the Serapis. The Constellation was the first of the new built vessels that went to sea, under Captain Truxton. She sailed in June, 1793, and was followed by the United States, and a little later, by the Constitution, both these latter sailing in July the same year. The first prize under our present naval organization, was the French Privateer La Croyable. She was a schooner of 14 guns, and was captured by the sloop of war Delaware, Captain Decatur. The above historical facts we have gleaned from Mr. Cooper's excellent Naval History of the United States.

IMITATION GROUND GLASS.

To make imitation ground glass that steam will not destroy, put a piece of putty in muslin, twist the fabric tight and tie it into the shape of a pad; well clean the glass first, and then pat it all over. The putty will exude sufficiently through the muslin to render the stain opaque. Let it dry hard, and then varnish. If a pattern is required, cut it out in paper as a stencil, place it so as not to slip, and proceed as above, removing the stencil when finished, If there should be any objection to the existence of the clear spaces, cover with slightly opaque varnish.

GLASS SPINNING.

A recent number of *Journal of Applied Science* gives an account of some modern improvements in the art of spinning glass. Brunfaut, a Viennese manufacturer, to whose perseverance and ingenuity we are indebted for the brilliant results here detailed, spins a thread of glass surpassing in fineness that spun by the silkworm, and almost as soft and elastic. He makes glass flock-wool wrappings for gouty patients, and the same material is used for filters by chemists. The threads are woven into textile fabrics, which are made into

cushions, carpets, table cloths, shawls, neckties, cuffs, collars, etc. As a material for fancy dresses, for tapestry, for covering furniture, for laces, embroidery and the like, the glass tissue will probably at some future time, occupy a prominent place. In softness it almost equals silk, and to the touch it is like the finest wool or cotton. It possesses remarkable strength, and remains unchanged in light or warmth, nor is it altered by moisture or acids. Spots may be removed from it by washing. Being incombustible, it is specially valuable for ladies' dresses. Clothes of this material are at once lighter and warmer than those of cotton or wool. A veil of glass fibres excludes dust remarkably well. The process of manufacture is as yet a secret.

STUCCO WORK.

The method of finishing the outside of buildings in stucco, still prevails to some extent in this country, notwithstanding that in the Northern States the severe frosts of winter make sad havoc with it, unless, as is rarely the case, it be of the first quality in composition and workmanship. We are in receipt of inquiries from the Southern States as to its adaptability to the wants of that section, and the method by which it is applied.

With regard to the first point, we have little doubt that stucco will endure longer at the South than at the North, especially if it be of inferior quality. A stucco in common use is a compound of the grout or putty made of stone lime or burnt shells mixed with sharp grit sand. Its long exposure to the air has, however, a tendency to render it crumbly, and it is not an unfrequent occurrence to see it cleaving off in large scales, giving the building a dilapidated appearance.

Much of this is to be attributed, as we have already said, to climate, but a great deal is to be charged to unskillful application and composition. The mortar should be most thoroughly beaten and worked before it is applied to the walls, and the strength of the lime should be well ascertained before the sand can be properly proportioned. Good rules for ordinary use in the mixing of this grout can not be given. Experience only can be relied upon as a guide for its composition. The lime may, however, be tested by slacking in the usual way. If fat, it should slack rapidly and swell up from two to three and one-half times its original bulk, the rapidity of the slacking, and the bulk after being slacked, being an index of its strength or fatness. The fatter it is the more sand will be required.

The best sand for stucco work is drift sand, and it is advantageous to dry it on iron plates, being careful not to push the heat so far as to discolor it. The grout being mixed should be parceled out into small portions and allowed to mellow for some days. It should then be thoroughly mixed into a soft putty, and spread thick upon the walls without any previous preparatory coat. It should also be thoroughly troweled down, as its durability depends very much upon the faithfulness with which this part of the work is performed. Too much stress can scarcely be given to this point, and thorough work should be insisted upon. Another coat should be put on before the first is dry, and this should also be well worked down. It will add much to the durability of this stucco if a coat of good boiled linseed oil be laid on after it is dry.

Various ingredients are recommended by good authority for the

strengthening of stuccos, the basis of which is lime. Among these is sugar water in mixing, the proportions being about one pound of coarse sugar to eight gallons of water used.

There are many other preparations used for stucco work, but although some of them are far more durable than the one we have described, they are, for the most part, too expensive to come into very general use. Among these are the well-known Adam's oil cement, and the stucco made by mixing pulverized marble with lime or plaster, and working it the same as ordinary plaster. A good, cheap cement for stucco work may, however, be made by using good hydraulic cement and clean sand mixed in proper proportions and in such quantities that it may all be laid on before it has time to set. The sand should be dried and mixed in the proportion of one part of cement to two parts of sand by measure. In measuring, the sand should not be packed, but thrown loosely in the measure.

Previous to the application of any stucco, the joints between bricks should be raked out, say from three-eighths to one-half an inch. The surface should then be thoroughly swept to free it from loose dirt, and afterward wet with a hose or other convenient means, and the stucco applied before it dries. If difficulty is experienced in making the stucco adhere to the flat surface of bricks or stones, they may be chipped with a hatchet or mill-pick. The first coat should not extend so far that a second cannot be laid over it before it dries, and the whole should be shielded from the direct action of the sun's rays while drying.

As soon as dried the surface should be inspected by raps with a very light hammer. The non-adherent spots may be thus detected, and should be immediately torn off and replaced. The most important of all these precautions is, however, the thoroughness in troweling mentioned above, without which any amount of pains in other particulars will prove vain.

ANNEALING GLASS IN OIL.

As is well known, very important characteristics are imparted to glass by a process of annealing in oil, by means of which quite a high temperature can be attained and kept at will. But this tempering in oil is not new, and no patent can be held except for the appliances by which it is done, and which may be different from those hitherto employed.

Prince Rupert drops, with which Bastie glass has been compared, are generally tempered by being dropped in water; but they were also dropped in oil a hundred years ago; those so prepared presenting quite different characteristics from those prepared in the ordinary way. More than half a century ago the *Gentleman's Magazine*, in an article on tempering glass, gave the following: "If the glasses are to be exposed to a higher temperature than boiling water, boil them in oil."

Those who contemplate taking stock in the Bastie process at the high price at which it is held by the inventor, will do well, before purchasing, to recollect the above mentioned fact and to, furthermore, consult the agents and other processes of a similar character, which are now represented in New York or in Europe. If the papers are to be believed, Baur in Vienna, Pieper in Dresden, Stahl in Berlin, and Meuse in Geiersthal are busy with their processes of tempering glass.

In these times of wonderful discov-

eries it will not do to suppose that any one man can take and hold every avenue to any coveted result. Hence glass makers and steam manufacturers may possess their souls in peace notwithstanding the claims of either Bastie or Keeler.

A prominent Pittsburg glass manufacturer remarked, in reference to the Bastie process: "This new invention possesses little practical importance. The glass trade will not be in any way injured by the new article. In fact it would seem of benefit only as applied to window glass, and time is required even to demonstrate that idea. Although the *mode of application* is original with M. LaBastie, the principle of annealing glass in oil was in use at the works of Bakewell, Pears & Co., Pittsburg, as early as 1822. At that time there were no presses; all ware was blown, and the fancy patterns cut on afterwards. As some articles were rather heavy, and while being cut were frequently shattered by the vibration, it was desired to so anneal the ware as to obviate that serious difficulty. As a consequence the following idea was adopted: A large iron kettle was filled with ware and fish oil poured over the whole until all the space was occupied. A fire was then started under the kettle and kept up until the highest attainable heat was secured, when the fire was allowed to die out and the glass cool gradually. In this way, the object was effected, and there was no more trouble by the breaking of ware on the cutter's stone.

OCEAN TELEGRAPH CABLES.

Up to 1847 no substance suitable for the insulation of a submarine wire was known. In 1846, Mr. James Reynolds, of New York, invented a machine for covering wire with India rubber, and during the year 1847, covered a large amount of wire with this substance; but in consequence of drying it (vulcanization of rubber being then unknown,) it proved a failure. Early in the spring of 1848, Mr. Craven brought a piece of wire covered with gutta percha to Mr. Reynolds, and asked if he could cover wire with gutta percha with his machine. Mr. Reynolds undertook to do so, and immediately proceeded to manufacture gutta percha covered wire. He covered the cable which was laid across the Hudson river between New York and Jersey City, which was the first gutta percha cable ever made, and the first submarine wire ever constructed and successfully operated for the transmission of intelligence over a distance of half a mile. The first submarine cable ever laid in the sea was laid between Dover and Calais, in 1850. It was a single strand of gutta percha, unprotected by any outside coating, and worked only one day. The next cable was also laid between Dover and Calais, in 1851. This contained four conducting wires, was 27 miles in length, and weighed 6 tons per mile. This cable is still working, after having been down 23 years. The next long cable was laid in 1853, between Dover and Ostend, a distance of 80 miles, and contained six conducting wires, and weighed $5\frac{3}{4}$ tons per mile. It is still in working order. In 1853 a cable of one conducting wire was laid between England and Holland, 120 miles, weighing $1\frac{3}{4}$ tons per mile. This cable worked for 12 years. From 1853 to 1858, 37 cables were laid down, having a total length of 3,700 miles, of which 16 are still working. Thirteen worked for periods varying from a week to five years, and the remaining 8 were total failures.

On the 6th of August, 1858, the first Atlantic cable was laid between Ireland and Newfoundland. The weight of this cable was 1 ton per mile, and its cost was as follows: Price of deep sea wire per mile, $200; price of spun yarn and iron wire per mile, $265; price of outside tar per mile, $20; total cost per mile, $485. Price, as above, for 2,500 miles, $1,212,500; price of 25 miles shore end at $1,450 per mile, $36,250; total cost, $1,249,235. This cable worked from August 10 to September 1, during which time 129 messages were sent from Valentia to Newfoundland, and 271 from Newfoundland to Valentia.

The next long cable which was laid was from Suez to India, a distance of 3,500 miles, in 1859. This cable was laid in five sections, which worked from six to nine months each, but was never in working order from end to end.

The total length of all the cables which have been laid is about 70,000 miles, of which over 50,000 miles are now in successful operation. The 20,000 miles of cables which have thus far failed, represent 58 in number.

Including the original 1858 cable, five cables have been laid down between Ireland and Newfoundland, of which only three are now in working order. These three were laid in 1866, 1873, and 1874. The cable of 1865, of a similar type as the above, has not been working for over two years.

The maximum speed of signaling through 2,000 miles of the Atlantic telegraph of 1858 was two and a half words a minute. The conductor of the Atlantic cable of 1858 consisted of a strand of seven copper wires of No. 22½ gage, weighing 93 pounds per mile, while those of 1865, 1866, 1873, and 1874, have each 300 pounds per mile. The highest rate of speed obtained through the 1858 cable was 2½ words per minute, while through the 1865, 1866, 1873, and 1874 cables, they have obtained a speed of 17 words per minute in regular working, and of 24 words per minute upon an experimental test.

HOW MESSAGES ARE SENT BY THE OCEAN CABLE.

He (the ocean telegraph operator) taps the "key" as in a land telegraph, only it is a double key. It has two levers and knobs instead of one. The alphabet used is substantially like the Morse alphabet; that is, the different letters are represented by a combination of dashes and dots. For instance, suppose you want to write the word "boy." It would read like this:

"— . . . — — — —. — — —"

B is one dash and three dots; O, three dashes: and Y, one dash, one dot, and three dashes. Now, in the land telegraph the dashes and the dots would appear on the strip of paper at the other end of the line, which is unwound from a cylinder, and perforated by a pin at the end of the bar or armature. If the operator could read by sound, we would dispense with the strip of paper, and read the message by the "click" of the armature as it is pulled down and let go by the electromagnet.

The cable operator, however, has neither of these advantages. There is no paper to perforate, no "click" of the armature, no armature to "click." The message is read by means of a moving flash of light upon a polished scale produced by the "deflection" of a very small mirror, which is placed within a "mirror galvanometer," which is a small brass cylinder two or three inches in diameter, shaped like a spool

or bobbin, composed of several hundred turns of small wire wound with silk to keep the metal from coming in contact. It is wound or coiled exactly like a bundle of new rope, a small hole being left in the middle about the size of a common wooden pencil. In the center of this is suspended a very thin, delicate mirror about as large as a kernel of corn, with a correspondingly small magnet rigidly attached to the back of it. The whole weighs but a little more than a grain, and is suspended by a single fibre of silk, much smaller than a human hair and almost invisible. A narrow horizontal scale is placed within a darkened box two or three feet in front of the mirror, a narrow slit being cut in the center of the scale to allow a ray of light to shine upon the mirror from a lamp placed behind said scale, the little mirror in turn reflecting the light back upon the scale. This spot of light upon the scale is the index by which all messages are read. The angle through which the ray moves is double that traversed by the mirror itself; and it is, therefore, really equivalent to an index four or six feet in length without weight.

To the casual observer there is nothing but a thin ray of light, darting to the right and left with irregular rapidity; but to the trained eye of the operator, every flash is replete with intelligence. Thus the word "boy," already alluded to, would be read in this way: One flash to the right, and three to the left, is B. Three flashes to the right is O. One to the right, one to the left, and two more to the right is Y, and so on. Long and constant practice makes the operators wonderfully expert in their profession, and enables them to read from the mirror as readily and as accurately as from a newspaper.

ORIGIN OF THE TERM BROTHER JONATHAN.

The story of the origin of the above term, is as follows:

"When General Washington, after being appointed commander of the army of the Revolutionary War, came to Massachusetts to organize it and make preparations for the defense of the country, he found a great want of ammunition and other means necessary to meet the powerful foe he had to contend with, and great difficulty to obtain them. If attacked in such condition, the cause at once might be hopeless. On one occasion, at that anxious period, a consultation of the officers and others was held, and it seemed no way could be devised to make such preparation as was necessary. His Excellency, Jonathan Trumbull, the elder, was then Governor of the State of Connecticut, on whose judgment and aid the General placed the greatest reliance, and remarked, 'We must consult Brother Jonathan on the subject.' The General did so, and the Governor was successful in supplying many of the wants of the army. When difficulties afterward arose, and the army was spread over the country, it became a by-word, 'We must consult Brother Jonathan.' The term Yankee is still applied to a portion, but 'Brother Jonathan' has now become a designation of the whole country, as John Bull has for England."

VALUE OF GOLD AND SILVER.

Many people have a great desire to know the value of gold and silver in bulk. The following statement from Prof. J. F. L. Schirmer, Superintendent of the Branch Mint in Denver, Colorado, may be relied upon as correct. The fineness of Colorado gold

and the calculation of values on gold and silver are also given. It is a matter of considerable value, and should be carefully preserved for reference.

One ton (2,000 pounds avoirdupois) of gold or silver contains 29,163 troy ounces, and, therefore, the value of a ton of pure gold is $602,799.21, and of a ton of silver, $37,704.84.

A cubic foot of pure gold weighs 1,218.75 pounds avoirdupois; a cubic foot of pure silver weighs 656.25 pounds avoirdupois.

One million dollars gold coin weighs 3,685.8 pounds avoirdupois; $1,000,000 silver coin weighs 58,029.9 pounds avoirdupois.

If there is one per cent. of gold or silver in one ton of ore, it contains 291.63 ounces troy, of either of these metals.

The average fineness of the Colorado gold is 781 in 1,000, and the natural alloy: gold 781; silver 209; copper 10; total, 1,000.

The calculations at the mine are made on the basis that 43 ounces of standard gold, or 900 fine (coin) is worth $800, and 11 ounces of silver 900 fine (coin) is worth $12.80.

HOW SHOE-PEGS ARE MADE.

Shoe-pegs were invented in 1818, by Joseph Walker, Hopkinton, Mass. At least the invention is attributed to him, though the evidence upon which this opinion is based is not altogether satisfactory. A shoe-peg is a little affair, but its invention was by no means an unimportant event. It worked perhaps as great a revolution in a most important branch of industry as was ever effected by a single device. Before its introduction the soles of all boots and shoes were attached to the uppers by sewing; now, nearly ninety per cent. of all the boots and shoes manufactured are pegged.

It has given birth also to numerous other important inventions: pegging awls of improved form, rasps for cutting off the parts of the pegs inside the boot, pegging machines, which will peg on a sole almost before one can think about it, machines for cutting, polishing, and bleaching pegs, etc., etc.

It is within the memory of the writer that shoe-pegs were made by hand. The timber from which they were made was sawed into blocks across the grain, of such a thickness as would, when the block was split into pegs, make them of the right length. Slabs, or bolts, thin as the body of the pegs wanted, were then split off by the use of a long, thin knife and a hammer; the knife being used like the instrument called a "*frow*" by coopers and shingle makers. The bolt or slab was next beveled on both sides of one edge. The slab thus prepared was next split into pegs one by one.

Of course such a rude method as this was destined to be supplanted by a far more rapid and perfect one, and there is probably no article so well made and finished that is sold cheaper than the modern shoe-peg.

It is worthy of remark that the same principles are applied to their manufacture by the best modern machinery as were adopted in the hand method.

The wood must be of some hard, close-grained variety, which splits easily. Hard maple and birch are the favorite woods for this purpose; birch, however, is, we believe, the shoe-peg timber *par excellence*.

The wood is cut into lengths of

about eight feet, and is sold by the cord, at three or four times the price of the same kinds of timber cut into fire-wood. The logs are received at the factory in the green state, and are worked up as wanted.

The first operation is peeling off the bark, an adze being employed for this purpose. The logs are next sawed into blocks across the grain, a little thicker than the length of the peg. These blocks are placed on a planing machine and the side which is intended for the heads of the pegs is planed smooth.

The blocks are now ready to be grooved. This is done very rapidly by a machine in which a cutting tool reciprocates rapidly across the face of the block, the block being at proper intervals of time carried along by feed rollers. After the blocks have been grooved one way, they are again grooved at right angles to the first grooves, and both sets of grooves being V-shaped, the surfaces of the blocks on one side, now present a regular succession of quadrangular pyramids, which are the points of the yet embryo pegs.

The next operation is splitting, which is done on machines operating very rapidly and with great precision. The splitting knives on these machines are pivoted at one end, and the other end is made to play rapidly up and down, the motion being similar to that of a shears-blade for trimming sheet iron. The pivoted end may be raised or lowered so that the knife may only enter the wood as far as required, the object being not to split the pegs entirely apart, but to have them hang together at the heads. The blocks are fed to the splitting knives by fluted rollers, the flutes of which fit the grooves in the blocks made by the grooving machines. The blocks are fed in with the planed side downward, and the splitting knife at each stroke enters the wood at the bottom of the V-shaped grooves with great accuracy. Thus the splitting is done from the points towards the heads of the pegs. When the block has passed through the splitting machine once, it is turned and fed through again at right angles to the direction in which it was first fed through, and after this operation the pegs are very nearly split apart, but they still hang together somewhat like a bunch of split lucifer matches. The object of keeping them thus together is to enable them to be fed to the machines in a mass. After the second feeding the block is forcibly thrown off the table of the splitting machine on to the floor, and the pegs fall asunder. The pegs at this stage are of different colors, somewhat rough on their sides, unseasoned and dusty. They are therefore dried in a tumbler heated by steam pipes, bleached with sulphur fumes till they assume a uniform white color, run through a fanning mill to free them from dust, and finally packed for market.

The extent of this manufacture is much greater than would seem possible to most people. It would seem at first, that if all the people in the world were shoemakers, they must be overstocked with pegs. There are numerous factories in the Eastern States turning out from fifty to one hundred bushels and upward of shoe-pegs per day, and still the demand keeps up. Anything in universal demand even if individually the demand is small, must foot up large in the aggregate for the civilized world. The New England States manufacture the greater part of all the shoe-pegs used.

CHANGES IN THE ENGLISH LANGUAGE.

Following are some specimens of the Lord's Prayer, as used at various periods in English history.

A. D. 1158.—Fader ur in heune, haleweide beith thi neune, cumin thi kuneriche, thi wille beoth idon in heune and in eirhe. The curyeu dawe bried, gif ous thilk dawe. And vorzif uer detters as vi vorsifen ure dettoures. And lene us nought into temptation, bot delvvor eus of evel. Amen.

A. D. 1300.—Fadir ure in heavene, Halewyd be thi name, thi kingdom come, thi wille be done as in heavene, and in erthe. Our urche days bred give us to daye. And forgive oure deters as we forgive oure dettourers. And lead us nought in temptation, bot delvvor us of evel. Amen.

A. D. 1370.—Oure fadir that art in heunes hallewid be thi name, thi kingdom come to, be thi wille done in earthe as in heune, geve to us oure breed "oure other substances," forgene to us oure dettis as we forgauen to oure detouris, lede us not into temptation, but delyuer us yvel. Amen.

A. D. 1525.—O oure fathe which arte in hevon, hallowed be thy name. Let thy kingdom come. Thy wyoll be fulfilled as well in earth as in hevon. Give us this daye oure dayly brede. And forgive us oure trespaces even as we forgive our trespacers. And leade us not into temptation, but delyver us from evell. For thyne is the kingdome and the power and the glorye forever. Amen.

A. D. 1581.—Our fater which art in heauean sanctified be thy name. Let thy kingdom come. Thy will be done, as in heauen, in earth also. Give us to-day our superstantial dread. And forgive our detts as we forgive our detters. And delivere us from evil. Amen.

A. D. 1611.—Our father which art in heaven, hallowed be thy name. Thy kingdom come. Thy will be done in earth as it is in heaven. Give us this day our dayley bread. And forgive our debts as we forgive our debtors. And lede us not into temptation, but deliver us from evil. For thyne is the kingdom, and the power, and the glory forever. Amen.

THE FIRST WATER WORKS.

The first water works in the Unitéd States appear to have been planned and constructed by Mr. J. C. Christensen, at Bethlehem, Pa., more than a century ago, namely, 1762. The machinery consisted of two single-acting force pumps, four-inch calibre and eighteen inch stroke worked by a triple crank, and geared to the shaft of an under shot water wheel eighteen feet in diameter and two feet clear in the buckets. The total head of water was two feet. On the water wheel shaft was a wallower of thirty-three rounds, gearing into a spur wheel of fifty-two cogs, attached to the crank. The three piston rods were attached each to a frame or cross-head working in grooves, to give them a parallel motion with the pump. The cross-head was made of wood, as well as the parts containing the grooves as guides. The water was raised by this machinery to the height of seventy feet, and subsequently to one hundred and fourteen. The first rising main was made of gum wood, as far as it was subject to great pressure, and the rest was pitch pine. In 1786 leaden pipes were substituted. In 1813 they were changed for iron. These works were in operation as late as 1832.

OUR PRESIDENTS.

GEORGE WASHINGTON.

1st PRESIDENT—1789 to 1797. BORN near the Potomac river in Westmoreland county, Va., Feb. 22, 1732. EDUCATED at common schools in the vicinity of his birth. DIED at Mt. Vernon, Dec. 14, 1799. A *farmer* and *surveyor*.

JOHN ADAMS.

2d President—1797 to 1801. BORN at Quincy, Mass., Oct. 19, 1735. EDUCATED at Harvard College, class of 1755. DIED at Quincy, July 4th, 1826. A lawyer.

THOMAS JEFFERSON.

3d President—1801 to 1809. BORN at Shadwell, Va., April 2, 1743. EDUCATED at William and Mary College. DIED July 4th, 1826, (same day as John Adams.) A lawyer.

JAMES MADISON.

4th President—1809 to 1817. BORN in King, George county, Va., March 16th, 1751. EDUCATED at Princeton College, class of 1771. DIED at Montpelier, Va., April 28, 1836. A lawyer.

JAMES MONROE.

5th President—1817 to 1825. BORN in Westmoreland county, Va., April 28, 1758. EDUCATED at William and Mary College. Died in New York city, July 4, 1831. A lawyer.

JOHN QUINCY ADAMS.

6th President—1825 to 1829. BORN at Braintree, Mass., July 11, 1767. EDUCATED at Harvard College, class of 1788. DIED in Washington, D. C., Feb. 23, 1848. A diplomatist.

ANDREW JACKSON.

7th President—1829 to 1837. BORN in Waxham Settlement, N. C., March 16, 1767. EDUCATED by self-application. DIED at the Hermitage, near Nashville, Tenn., June 8, 1845. General.

MARTIN VAN BUREN.

8th President—1837 to 1841. BORN at Kinderhook, N. Y., Dec. 5, 1782. EDUCATED at the academy in his native town. DIED at Kinderhook, N. Y., July 24, 1862. A lawyer.

WILLIAM HENRY HARRISON.

9th President—March 4 to April 4, 1841. BORN in Charles City county, Va., Feb. 9, 1773. EDUCATED at Hampden, Sidney College. DIED at Washington, D. C., April 4, 1841. A general.

JOHN TYLER.

10th President—April 4, 1841 to 1845. BORN in Charles City county, Va., March 1790. EDUCATED at William and Mary. DIED at Richmond, Va., Jan. 18, 1862. A lawyer.

JAMES K. POLK.

11th President—1845 to 1849. BORN in Mecklenburg county, N. C., Nov. 2, 1799. EDUCATED at University of North Carolina. DIED at Nashville, Tenn., June 15, 1849. A lawyer.

ZACHARY TAYLOR.

12th President—March 4, 1849, to July 9, 1850. BORN in Orange county, Va., Nov. 24, 1784. EDUCATION—limited. DIED in Washington, D. C., July 9, 1850. A general.

MILLARD FILLMORE.

13th President—July 9, 1850, to 1853. BORN in Cayuga county, N. Y., Jan. 7, 1800. EDUCATED in common schools. DIED in Moravia, N. Y., March 8, 1874. A lawyer.

FRANKLIN PIERCE.

14th President—1853 to 1857. BORN at Hillsborough, N. H., Nov. 23, 1804. EDUCATED at Bowdoin College. DIED in Concord, N. H., Oct. 8, 1869. A lawyer.

JAMES BUCHANAN.

15th President—1857 to 1861. BORN in Franklin county, Pa., April 22, 1791. EDUCATED at Dickinson College, 1809. DIED at Wheatland, Pa., June 1, 1868. A lawyer.

ABRAHAM LINCOLN.

16th President—1861 to April 15, 1865. Born in Hardin county, Ky., Feb. 12, 1809. Educated by himself, *dame nature*, exclusively. Was assassinated at Washington, D. C., April 15, 1865. An uncommon lawyer.

ANDREW JOHNSON.

17th President—April 15, 1865, to 1869. Born at Raleigh, N. C., in 1808, Educated nowhere. Died at Greenville, Tenn., Aug. 1, 1875. A tailor.

ULYSSES SIMPSON GRANT.

18th President—1869 to 1877. Born at Point Pleasant, Clermont County, Ohio, April 27, 1822. Educated at West Point Military Academy. Died on Mount McGregor, near Saratoga, N. Y., July 23, 1885.

RUTHERFORD BURCHARD HAYES.

19th President—1877 to 1881. Born in Delaware, Ohio, May 16, 1828. Educated at Kenyon College, Gambier, Ohio.

JAMES A. GARFIELD.

20th President—March 4 to Sept. 19, 1881. Born at Orange, Cuyahoga county, Ohio, Nov. 19, 1831. Assassinated July 2, 1881. Died Sept. 19, 1881. Educated at Hiram College, Portage county, Ohio. Lawyer.

CHESTER A. ARTHUR.

21st President—Sept. 19, 1881, to March 4, 1885. Born in Fairfield, Franklin county, Vt, Oct. 5, 1830. Educated at Union College, N. Y. A Lawyer. Died Nov. 18, 1886.

GROVER CLEVELAND.

22d President—March 4, 1885, to March 1, 1889. Born March 18, 1837, in Caldwell, Essex Co., N. J. Lawyer.

BENJAMIN HARRISON.

23d President—March 4, 1889. Born in North Bend, Ohio, Aug. 20, 1833. Educated at Miami University, Ohio. A Lawyer.

GUM ARABIC.

Gum Arabic is obtained from the *Acacia Arabica* or *Acacia vera* which grows upon the banks of the Nile and in Arabia. In July, a gummy juice exudes from the trunk and the principal branches of the acacia tree. In about fifteen days it thickens in the furrow, down which it runs, assuming the form of oval and round tears about the size of a pigeon's egg, of different colors, as they belong to the white or red gum tree. About the middle of December the Moors encamp on the borders of the forest, and the harvest lasts six weeks. The gum is packed in very large sacks of leather, and brought on the backs of the bullocks and camels to certain ports, where it is sold to the French and English merchants.

NEW YORK FIFTY YEARS AGO.

Fifty years ago it took a whole day to go to Philadelphia, and the passage to Boston required two days. Two steamboats, leaving New York every other day, were sufficient to carry all the passenger traffic between New York and Boston. The passage from here to Providence cost eight dollars, and from Providence to Boston the distance was made in stage coaches. One small steamboat was sufficient for all the Sound travel between New York and Hartford. Two small steamboats carried all the passengers between Albany and New York.

The population of New York fifty years ago, was about 130,000—hardly more than a quarter of the present population of Chicago, which then had no existence except as an Indian outlook.

Brooklyn was a straggling village of

seven thousand inhabitants, and there was but one steam ferry-boat on the East River. The largest ship then sailing from the port did not exceed 500 tons burden. Postage on a single letter sheet by mail to Boston, was eighteen and three-quarters cents. There were no envelopes. Mucilage was unknown, and it was considered disrespectful not to seal a letter with a great lump of red wax. There were no omnibusses nor street railways. The City Hall Park was surrounded by a shabby wooden fence; hogs ran at large through all the streets and wallowed in the gutters. There were no sewers, nor gas-lights, nor Croton water, nor fountains, nor bath-rooms, nor hydropathic boarding-houses, and ice-carts were hardly known, and refrigerators unheard of. Around every church inclosure was a burying-ground. Men wore moccasins to meeting in winter weather, and women had foot-stoves, containing heated bricks, to keep their feet from freezing. Fifty years ago there was not one Congregational church in New York, and but two Catholic churches. The Jews found one small synagogue sufficient for all the descendants of Abraham then here. The Methodists were then so poor and so modest that they put no steeples nor belfreys upon their meeting-houses, and their "Book Concern" was a little shop down in Fulton street. Fifty years ago there were no Hicksites, nor Mormons, nor Spiritualists, nor homeopaths, nor hydropaths, nor temperance societies, nor prohibitionists, nor eclectics, nor chloroform, nor meerschaums, nor lager, nor sewing machines, nor ready-made clothing, nor anthracite coal, nor police, nor detectives, nor safes, nor life insurance companies, nor trust companies, and only one savings bank. There was no weather bureau, nor "probabilities," nor paid fire department, nor steam fire engines. There was no Calfornia gold, nor Nevada silver. There was no Boss Tweed nor a Fernando Wood; but there was corruption enough in politics as anybody may see by reading the daily papers of those good old times, in which DeWitt Clinton was denounced for his enormous wickedness in plunging the State in debt for the purpose of digging a big ditch to connect Lake Erie with the Hudson River.

Fifty years ago, extras were altogether unknown. There was then no *Sun,* no *Herald,* no *Tribune,* no *Times,* no *Journal of Commerce,* no *World,* no *Independent,* no *Evening Express,* nor any religious paper of any kind. There was only one hotel of any importance —the City Hotel.

There was but one rich man in New York, whose name was Astor. Peter Cooper was keeping a corner grocery in the Bowery; Vanderbilt was keeping a tavern in New Jersey, and A. T. Stewart had just opened a small dry goods store on Broadway. There was no Barnum, no Bourcicault, nor Wallack's, and but one place of amusement —the old Park Theatre. There were no photographs, no illustrated papers, no monthly magazines, no telegrams.

DEPTH OF AMERICAN LAKES.

There is a mystery about the American lakes. Lake Erie is only 60 or 70 feet deep; but Lake Ontario, which is 592 feet deep, is 230 feet below the tide level of the ocean; or as low as most parts of the Gulf of St. Lawrence; and the bottoms of Lakes Huron, Michigan, and Superior, although the surface is much higher, are all, from their vast depths, on a level with the bottom of Ontario. Now, as the discharge

through the River Detroit, after allowing for the probable portion carried off by evaporation, does not appear by any means equal to the quantity of water which the three upper lakes receive, it has been conjectured that a subterranean river may run from Lake Superior, by the Huron, to Lake Ontario. This conjecture is not improbable, and accounts for the singular fact that salmon and herring are caught in all the lakes communicating with the St. Lawrence, but no others. As the Falls of Niagara must have always existed, it would puzzle the naturalist to say how these fish got into the upper lakes without some subterranean river; moreover, any periodical obstruction of the river would furnish a not improbable solution of the mysterious flux and reflux of the lakes.

SERVANTS THREE HUNDRED YEARS AGO.

What would servants in the present day say to such a code of rules and regulations as was adopted three hundred years ago in the household of Sir J. Harrington, the translator of Ariosto? A servant absent from prayers to be fined five cents; for uttering an oath, three cents, and the same sum for leaving a door open; a fine of five cents from Ladyday to Michealmas for all who are in bed after seven a. m., or out after nine p. m.; a fine of three cents for any beds unmade, fire built or candle box uncleaned after eight; a fine of ten cents for any man detected teaching the children obscene words; a fine of three cents for any man waiting without a trencher, or who is absent at a meal; for any one breaking any of the butler's glass, twenty-five cents; a fine of five cents for any one who has not laid the table for dinner by 10:30 or the supper at six; a fine of ten cents for any one absent a day without leave; for any man striking another, a fine of three cents; for any follower visiting the cook, three cents; a fine of three cents for any man appearing in a foul shirt, broken hose, untied shoes, or torn doublet; a fine of three cents for any stranger's room left for four hours after he be dressed; a fine of three cents if the hall be not cleansed by eight in winter and seven in summer; the porter to be fined three cents if the court gate be not shut during meals; a fine of ten cents if the stairs be not cleansed every Friday after dinner. All these fines were deducted by the steward at the quarterly payment of the men's wages.

UNCLE SAM.

Immediately after the declaration of war with England, in 1812, Elbert Anderson, of New York, then a contractor, visited Troy, where he purchased a quantity of provisions. The inspectors of the articles at that place were Ebenezer and Samuel Wilson. The latter gentleman (universally known as "Uncle Sam,") generally superintended in person a large number of workmen, who, on this occasion, were employed in overhauling the provisions purchased by the contractor. The casks were marked "E. A.—U. S." Their inspection fell to the lot of a facetious fellow, who, on being asked the meaning of the mark, said he did not know, unless it meant *Elbert Anderson and Uncle Sam*, alluding to *Uncle Sam Wilson*. The joke took among the workmen, and passed currently; and "Uncle Sam," when present, was often rallied by them on the increasing extent of his possessions.

ASSAYING.

Assaying is a branch of chemical analysis, the object of which is to determine the quantity of gold or silver in any mixture of the baser metals. As gold and silver have for many ages afforded the most obvious standard of value in civilized countries, it was of great importance to persons who dealt in coin, plate and similar articles, to be able to decide quickly and with certainty on the exact portion of alloy which each piece might contain, and its exact weight to the minutest subdivision of weights. At an early period the trade of the goldsmith not only comprised, as now, the dealers in or makers of gold and silver articles, but also that trade which has, since the separation of the two ancient branches, received the name of Bankers. No tax was then levied on manufactured plate, but all articles made of gold and silver were to be of the same degree of purity as the coin of the realm. Whatever was manufactured in London, or in some of the larger places, was ordered to be assayed and stamped by the warders of the craft in such town; but whatever was made "where no touch was ordained" was to be stamped by the maker, and if found beneath the proper standard, it was confiscated to the Crown. In this state of affairs, any article of plate would be of the same value in equal weights as gold or silver in ingots; and hence, as occasion might require, the vessels being worth no more than their weight, would be, on every pressing emergency, readily converted into coin. The workmanship of plate would in that age cost but little, as luxury had not reached the point in that kind of art, which it soon afterwards attained in the hands of Benvenuto Cellini, at Florence, and of his successors in the other parts of Europe. The taste displayed in the forms and decorations of gold and silver utensils was very coarse both in France and England. Voltaire says that the work of the goldsmith in Paris was so bad that the King (Louis XII), in 1501, forbade the manufacture, so that the French had their plate from Italy. There seems good reason to believe that the English of that period did not excel the French artisans in the fabrication of gold and silver articles. Although the assay of the precious metals is very simple in principle, great skill is required. A skillful assayer is able, from the sample of a few grains, to determine the standard of very large masses of the most valuable metals. The principle of assaying is as follows:—when gold, silver and platinum are exposed to the air, either in the solid state or in a state of fusion, they do not oxidize like the other metals, but retain their metallic lustre, on which account they obtained their name of *perfect* or *noble* metals. Hence, when a noble metal is alloyed with an inferior metal, if the alloy be melted in contact with the air, the latter will gradually become oxidized and the scales of oxide rising to the surface, can be removed from time to time until the whole of the baser metal is separated. When the baser metal does not oxidize very readily, as in the case with copper, this separation becomes more difficult and even impossible by heat alone, if the portion of copper be small; but by adding to the mixture a portion of some metal which oxidizes very readily, such as lead or bismuth, the more refractory metal oxidizes with greater ease, and thus the noble metal is left pure. On this account, litharge or oxide of lead, was termed by the old chemists, *the bath*

of the noble metals, scouring or cleansing them, as it were, from their alloys of base metal, and leaving them bright and pure.

PENS.

The earliest pens, such as were used for writing on papyrus with a fluid ink, appear to have been made of reeds. In our translation of the Old and New Testaments, the word pen refers either to an iron style used with waxed tablets, or to a *reed*, quills not having been introduced earlier than the fifth century. It is uncertain what particular kind of reed was used for making pens, but it is described as a small, hard, round, swan's quill. The supply of these reeds was obtained from Egypt, Cairo, in Asia Minor, and Armenia. Chardin and Tournefort describe a kind of reed used for pens in Persia. These reeds are collected near the shores of the Persian Gulf, whence they are sent to various parts of the East. After being cut, they are deposited for some months under a dunghill, when they assume a mixed black and yellow color, acquire a fine polish and a considerable degree of hardness and the interval pith dries up into a membrane which is easily detached. The quills used for pens are chiefly from the goose, the swan and the crow. The general use of steel pens has greatly lessened the demand for quills. Most of the goose quills are from the Netherlands and Germany, Russia and Poland. In the two latter countries vast flocks of geese were maintained for the sake of their quills. When the demand was large, this country has received from St. Petersburgh alone, as many as 27,000,000 quills in one year. The quills as they come from the bird, are covered with a membrane and are tough and soft so that they will not make a clean slit. These defects are got rid of and the quills are prepared for the pen-maker, by sorting according to the length of and thickness of the barrel. They are then clarified by the removal of the membranous skin, for which purpose they are plunged for a short time into hot sand, the heat causing the outer skin to crack and peel off, its removal being facilitated by scraping with a sharp instrument, at the same time the interval membrane becomes shriveled up and falls down towards the point of the quill. The effect of the heat is also to consume or dry up the oily matter of the quill and thus to render the barrel transparent.

This process, which may be repeated several times, is called *dutching*, probably from the circumstance of its having been first adopted in Holland. The effect of the process is to give the barrels the color of fine, thin horn, or an impure white. In some cases a uniform yellow color is produced by dipping the barrels in diluted nitric acid, this process hardens them. The quills having been dressed and finished, a portion of barb is stripped off so as to occupy less room in packing, and the quills are tied up in bundles of 25 or 50 each, for the market. Before steel pens became common, a number of pens were cut out of the barrel of a quill, just as they are now cut out of sheet steel. From the softening of the quill pen by the ink, and the wear of the points by friction, frequent mending was required and very bad writing was the result. The first attempts to render pens more permanent, consisted in arming the ribs with metallic points. Pens were also constructed of horn, tortoise and other shells and also of glass. Also horn and tortoise-shell were used, cut into ribs, softened in boiling water, and small pieces of dia-

mond, ruby, etc., imbedded into them by pressure. Thin pieces of gold or other metal have also been attached to tortoise shell. Pens were also constructed with two flat slips of gold, placed angularly, side by side, and tipped with rhodium. The first notice we find of steel pens for writing is in 1803, when Mr. Wise constructed barrel pens of that metal, mounted in a bone case, for carrying in the pocket. These were costly and not very successful. This form of pen as improved by Mr. Gillott, of Birmingham, was for many years in request. In the improved pen, metal of better quality, thinner and more elastic, was employed; the slit was made shorter and the finish and temper of the metal more carefully attended to. At the same time, such was the reduction in price, that a gross of pens was sold for little more than what was charged for one of Mr. Wise's pens. There are some doubts whether it was Mr. Gillott or Mr. Perry who first introduced the improvements which led to the present form and make of steel pens. It is claimed by both parties, each having taken out a number of patents for their pens.

ROPE.

Rope-making is an art which all nations seemed to have practiced from the earliest times. Various kinds of fibre have been used for the purpose such as hemp and flax, tough grass, the husk of the cocoanut, the fibres of the wild banana, etc.; animal substances have also been used such as strips of ox hide, horse hair and wool, and in our own day metalic wires have been twisted and plaited into cords and ropes of great strength, and of various sizes. Thongs of leather were used in the rigging of ships during many ages, and at the present time in some parts of the world ropes of considerable length and strength are made by twisting thongs of leather. The ancient Romans are said to have made ropes by the twisting of vegetable fibres long before the time of Cæsar, and after the invasion of Britain by that people they are said to have used our native rushes or *junci* for forming ropes. Some writers suppose this to be the origin of the term *junk* applied to old cables and worn out ropes.

BASKETS.

The ancient Britons were celebrated for their baskets, which were exported in large quantities, and brought high prices in Rome. Baskets are made of osier, wicker, rushes, straw, twigs, branches, and different kinds of hard wood, prepared solely for this purpose. The art of interweaving twigs and reeds, is practiced among the rudest nations at the present day, and they even excel Europeans in this simple art. In some parts of South America, the natives make rush baskets so closely interwoven as to hold water. Wicker boats, covered with skins, attracted the notice of the Romans in Britain, and at the present day, basket boats made of split bamboo are used in Hindostan. Houses, cottages, fences and gates of wicker-work, are used in different parts of the world.

ALLIGATOR LEATHER.

Twenty years ago the secret of tanning the alligator hide was revealed to a partner of a Boston boot and shoe house by an old Canadian. The business of collecting and tanning the skins was at once commenced, and now from 17,000 to 20,000 are tanned yearly, which are consumed by boot

and shoe manufacturers in every portion of the United States, as well as exported to London and Hamburg. In the foreign trade, however, the French are formidable rivals, owing to their superior methods of tanning, in which, as a nation, they beat the world.

The alligators formerly came almost entirely from Louisiana, and New Orleans was the great center of the business. Owing to their indiscriminate and judicious slaughter, however, the animals became thinned out, and but little business in that line is now done in the Crescent City. The Florida swamps and morasses are now the harvest fields, and Jacksonville, in that State, is the grand depot. The animals are killed in great numbers by the passengers of river steamboats, though there are hunters who make a regular business of their capture. The alligators often attain a length of eighteen to twenty feet, and frequently live to a fierce old age. The hides are stripped off, and the belly and sides, the only portions fit for use, are packed in barrels, in a strong brine, and shipped to the Northern tanner, who keeps them under treatment for from six to eight months, when they are ready to be cut up.

So far, the leather has been principally used in the manufacture of boots and shoes, for which it is especially adapted; and, by reason of the pleasing variegation of its surface, makes a most excellent and becoming protection for the masculine, and, indeed, the feminine foot, for it is beginning to be employed in the manufacture of ladies' boots. Handsome slippers are also made, both of the blacked and unblacked skin, as well as shopping bags, portemonnaies, cigar cases and small leather goods, though, owing to the unfavorable state of trade, these latter have not been extensively introduced.

CHANGING COLORS OF FLOWERS.

Professor Gabba has been examining the effects of ammonia on the color of flowers. It is well known that the smoke of tobacco will, when applied in sufficient quantity, change the tint of flowers, but Professor Gabba experiments by pouring a little ammonia into a saucer and inverting a funnel over it. Placing the flowers in the tube of the latter, he finds that blue, violet and purple colored blossoms become of a fine green, carmine and crimson become black, white becomes yellow, while parti-colored flowers, such as red and white are turned to green and yellow. If the flowers are immersed in water, the natural color will return in a few hours. Professor Gabba also found that asters acquire a pleasing color when submitted to the fumes of ammonia.

HOW THE FRENCH FATTEN THEIR POULTRY.

Any of our countrymen who, from rheumatic gout, or any other ailment, may be sent to Vichy, would do well, as soon as they have sufficiently recovered the use of their legs, to pay a visit to the Villa Belvedere, where a very singular mode of fattening poultry has been for some time successfully pursued. A large circular building, admirably ventilated, and with the light partially excluded, is fitted up with circular cages, in tiers rotating on a central axis, and capable of being elevated, depressed, or rotated, which are so arranged that each bird has as it were, a separate stall, containing a perch. The birds are placed with their tails converging to a common center, while the head of each may be brought in front by a simple rotary movement of the central axis. Each bird is

fastened to its cell by leathern fetters, which prevent movement, except of the head and wings, without occasioning pain. When the feeding time comes, the bird is enveloped in a wooden case, from which the head and neck alone appear, and which is popularly known as its "paletot," by which means all unnecessary struggling is avoided. The attendant (a young girl) seizes the head in her left hand, and gently presses the beak, in order to open it; then, with her right, she introduces into the gullet a tin tube about the size of a finger. This tube is united to a flexible pipe, which communicates with the dish in which the food has been placed, and from which the desired quantity is instantaneously injected into the stomach. The feeding process is so short that two hundred birds can be fed by one person in an hour. The food is a liquid paste, composed of Indian corn and barley saturated with milk. It is administered three times a day, in quantities varying according to the condition of each bird. The food seems to be very satisfactory, for if any chances to fall they devour it all as soon as they are released from their paletots. The poultry house is well ventilated; but, of course, it is impossible for any place where six hundred fowls are confined to be entirely free from smell. It takes about a fortnight to fatten a bird by this method. Before being killed the birds are left in a dark but well ventilated chamber for twenty-four hours without food. Each fowl is then taken up by its feet, is wrapped up so as to prevent all struggling, and then bled so adroitly in the throat that its death seems instantaneous. The blood is then allowed to flow from it, and finally, after being plucked, washed, and cleaned, it is wrapped in a damp cloth and is ready for sale. From forty to fifty fowls are thus killed and sold daily.

MARINER'S COMPASS.

The history or invention of the Mariner's Compass is rather obscure. The honor of the invention or discovery has been often bestowed on Givia, a citizen of Amalphi, who lived about the commencement of the fourteenth century. But the polarity of the magnet was known to the Saraces at least two hundred years before that time; through even after the time of Givia it was long before the magnet was made use of as a guide in navigation. The writers of the thirteenth century who mention the polarity of the needle, mention also its use in navigation; yet Capmany has found no distinct proof of its employment till 1403 and does not believe that it was frequently on board Mediterranean ships at the latter part of the preceding age. The Genoese, however, are known in the fourteenth century to have come out of that inland sea and steered for Flanders and England. The greatest sailors of the age were the Spaniards and Portuguese. This nation had little or no existence during the greater part of the middle ages, but in the twelfth, thirteenth and fourteenth centuries, they were able to expel the Moors from a great part of their country; and in the beginning of the fifteenth, John, surnamed the Bastard, who was then their king, was the first European prince who exhibited a respectable navy. It was in the year 1486, that this adventurous people first doubled the Cape of Good Hope.

PLEADINGS in courts of judicature introduced A. D., 788.

ANCIENT AND MODERN THEATRES.

The origin of the drama is involved in obscurity, dating far back in prehistoric ages, although it was by no means known to all nations even among the ancients. Thus there is in Hebrew literature no trace of the drama proper, although the solemn feasts and significant, impressive ceremonies of the old Jewish religion were not without a strong dramatic effect, and presented to the children's children of the generation that followed Moses out of Egypt, a thrilling allegorical history of their fathers' escape from bondage. The people of Western Asia, the Arabians and the Persians, knew nothing of the drama, whereas the Etruscans of Italy, so strongly resembling the Egyptians in other particulars, had their theatres, and the Etruscan name for an actor, histrio, is still preserved and used to day, in our "histrion." The ancient Peruvians had their tragedies and comedies, and even in the South Sea Islands, the first English circumnavigators found a rude kind of drama. The Chinese have had their theatres from the earliest days of their history, but their drama has never improved, and is to day what it was, no man can tell how long ago. Their plays are almost interminable in length, and require days and sometimes even weeks for presentation. The invention of dramatic entertainments is usually ascribed by Hindu writers to a Muni, or inspired sage, named Bharata, about B. C. 600; but, according to some authorities, they had a still more elevated origin, and the art, having been gathered from the Vedas (sacred writings) by the god Brahma, was by him communicated to the Muni. The dramatic representations first invented consisted of three kinds —Natya, Nritya, Nritta; and these were exhibited before the gods by the spirits and nymphs of Indra's heaven, who were trained by Bharata to the exhibition. The god Siva added two other kinds, the Tandava and Lasya. Of these, only one, the Natya, is properly the dramatic, being defined to be gesticulation with language. The Nritya is gesticulation without language, or pantomine; and the Nritta is simple dancing. Tandava and Lasya are only styles of dancing. The attribution of the invention of dramatic performances to Bharata is founded upon his having been one of the earliest writers by whom the art was reduced to a system. The dramatic writings of the Hindus present no distinction between comedy and tragedy. The Hindu dramas are invariably of a mingled web, and blend seriousness and sorrow with levity and laughter, but never, however, offer a calamitous conclusion; and although they propose to excite all the emotions of the human breast, terror and pity included, they never effect this object by leaving a painful impression upon the mind of the spectator. This absence of tragic catastrophe is not an unconscious omission, but is prohibited by a positive rule, and the death of either the hero or the heroine is never to be announced. A regard for decorum also provides that death must invariably be inflicted out of the view of the spectators; also that the following topics shall be interdicted: hostile defiance, solemn imprecations, exile, degradation, national calamity, biting, scratching, kissing, eating, sleeping, the bath, the unction, the marriage ceremony; and a wife was never to be made the object of a dramatic intrigue. In these respects the Hindu drama is a rebuke to many of the dramatic writings of modern Chris-

tendom. The Hindus never had any building appropriated to public entertainments, and consequently they had no complicated system of scenery or properties.

Among the Greeks, the drama had its rise in the banquets and feasts in the service of their heathen deities. Greece was pre-eminently the land of music and poetry, and as both were largely used in their worship, their choruses and hymns and dances naturally developed into the drama, which thus found its origin in the rude festivities on the Grecian feast days. The hymns addressed immediately to the divinity round the altar, during the service, were grave, lofty and restrained. The songs inspired by the carousals of the banquet, and uttered amid the revelries of the Phallic procession, were coarse, ludicrous and satirical, interspersed with mutual jest and gibe. The hymn which accompanied the opening festival was called the dithyramb—a term of doubtful import, and perhaps, like the repulsive symbol of the Phallic rites, of Eastern origin. Besides the dithyrambic chorus and the singers of the Phallic, there was a third class of performers in these festivals—fauns and satyrs, attendants of the deity; and their half-animal character was quite in harmony with the merry Dionysia. The goat was the appropriate offering in the Bacchic sacrifice. In the horns and hide of the victim, all that was requisite to furnish satyric guise was at hand; and thus a band of mummers was easily formed, whose wit, waggery and grimace would prove no insignificant addition to the amusement of the village carnival. In these rude festivities the splendid drama of the Greeks found its origin. The lofty poetry of the dithyramb, joined with the epic elements of the Ionians, was at length wrought out into majestic tragedy. The Phallic song was expanded and improved into the old comedy, and the tragic chorus originated in the Dorian chorus of dancers. At first the whole population took a part in the choral music and dancing; but with the gradual improvement of their music, the ruder efforts of the old crowd of worshipers were necessarily superseded; and the poet, as "State-workman," with his band of trained singers and dancers, at length executed all the religious functions of the collective population. The next step towards the drama was the introduction of the warlike dances of the Dorians into the celebration of Bacchic worship. Arion, a celebrated cithara-player, about B. C. 600, invented the Cyclic chorus, in which the dithyramb was danced around the blazing altar by a band of fifty men or boys, to a lyric accompaniment. Arion thus, by composing regular poems to be sung to the lyre, at once raised the dithyramb to a literary position. He turned the irregular comus into a standing chorus, and the steps of the altar of Bacchus became a stage on which lyric poetry in his honor was solemnly recited, and accompanied by corresponding gesticulations. He was also the inventor of the tragic style, a style of music or harmony adapted to and intended for a chorus of satyrs.

The tragedy, so soon as it had once established itself in Greece, made rapid progress. The invention of tragedy is popularly ascribed to Thespis, in the sixth century B. C. He introduced an actor for the sake of resting the Dionysian chorus, and this actor was generally, perhaps always, himself. In order to disguise his features he smeared his face with a pigment prepared from the herb purslain, and afterwards con-

structed a linen mask, in order, probably, that he might be able to sustain more than one character. He also introduced some important alterations into the dances of the chorus. Thespis was by birth a worshiper of Bacchus, and from the subjects of his recitations it would also appear that he was a rhapsode. Here, then, we have the union of Dionysian rites with rhapsodical recitations. But he went a step farther: he did not confine his speech to mere narration; he addressed it to the chorus, which carried on with him, by means of its coryphæi, a sort of dialogue. The chorus stood upon the steps of the thymele, or altar of Bacchus; and in order that he might address them from an equal elevation, the actor was placed upon a table, which was the predecessor of the stage. After Thespis, Phrynichus, his pupil, became the leader of tragedy, and he was once fined 1,000 drachmæ for having so forcibly recalled in his acting, the capture of Miletus, by the Persians, that the audience was affected to tears. Phrynichus was the first to introduce female characters on the stage. Following Phrynichus, Æschylus, born 525 B. C. was the next to improve the tragedy, and he almost perfected it. Sophocles, who gained his first prize in tragedy over Æschylus, B. C. 468, was the perfection of Greek dramatic art. Euripides, who was born B. C. 480, was the last of the Greek tragedians, properly so called.

The place of exhibition was, in the days of the perfect Greek drama, the great stone theatre erected within the Lenæon, or inclosure sacred to Bacchus, at Athens. The building was commenced B. C. 500, but not finished until about 381. In the earlier days of the drama the theatre was of wood, but an accident having occurred at the presentation of some plays by Æschylus and Pratinas, the stone theatre was commenced in its stead. To entertain an adequate notion of the Greek theatre, it must not be forgotten that it was only an improvement upon the mode of representation adopted by Thespis. The two original elements were the altar of Bacchus, round which the Cyclian chorus danced, and the stage from which the actor spoke, and which was the representative of the wooden table from which the earliest actor addressed his chorus. But in the great stone theatres these were surrounded by a mass of buildings, and subordinate to other details of a very artificial and complicated description. In building a theatre the Greeks always availed themselves of the slope of a hill, which enabled them to give the necessary elevation to the back rows of seats, without those enormous substructions found in Roman theatres. If the hillside was rocky, semi-circles of steps, hewn out of the living material, rose tier above tier; but if the ground was soft, an excavation was made, and afterwards lined with rows of stone benches. The scenery and mechanical contrivances of the Athenian stage were hardly inferior to those of the modern stage. Scene-painting in the time of Agatharchus, a celebrated scenic artist, contemporary with Æschylus, became a distinct and highly cultivated branch of art; and the scenery, which was regularly placed before the main scene, was apparently painted on canvas, the framework being of solid wood. When groves were represented, real evergreens were placed upon the stage. The scenery was arranged on perspective principles, and no expense was spared to make the illusion perfect. Besides the triangular revolving prisms, before referred

to, and which were also used occasionally to introduce a sea divinity on his fish-tail steed, a river god with his urn, or other incidental apparitions, there was a machine on wheels which displayed an interior of a chamber or other room, and which could be moved on to the stage through any of the principal doors. Deities conversed with the actors or chorus from a platform surrounded by clouds, and suspended from the top of the central scene. There was a contrivance for snatching up an actor from the stage and raising him to the balcony of the scene; and by an arrangement of ropes and pullies, Bellerophon or Trygæus could fly across the stage. Then there was a contrivance for imitating the sound of thunder, which appears to have been bladders full of pebbles, which were rolled over sheets of copper. The appearance of lightning was produced by means of a triangular prism of mirrors. And the catalogue of Julius Pollux speaks of a great variety of other ingenious contrivances. It was not by the desire to enliven their holiday leisure by such exhibitions that the Romans were led to the invention of theatrical amusements; but (B. C. 364) in the disconsolateness of a pestilence they first caught at the theatrical spectacle, as an experiment to propitiate the wrath of the gods, the exercises and games of the circus having till then been their only public exhibitions. But the histriones, whom for this purpose they called in from Etruria, were only dancers. Their oldest spoken dramas, the Atellane Fables, were borrowed from the Oscans, and with these Saturnæ (so called because they were at first improvisatory farces, without dramatic coherence, for saturna means a medley) they rested satisfied till Livius Andronicus, B. C. 240, began to imitate the Greeks, and introduced the regular kind of drama, namely, tragedy and new comedy. Thus the Romans were indebted to the Etruscans for their first notion of the stage spectacle, to the Oscans for the effusion of sportive humor, and to the Greeks for the higher cultivation. But the Romans lacked that mild spirit of humanity which is noticeable in Grecian history, and in tragedy they aimed at the wildest extremes. In their triumphal processions, gladiatorial games and wild beast fights, the spectator, though he was shown all the magnificence of the world, was glutted with the most violent scenes of blood. When Rome was converted to Christianity, the princes suppressed the gladiatorial combats but the games of the circus and the pantomine continued to be popular from the age of Augustus to the sixth century.

Ancient art declined with the advance of Christianity, and after a long period of stagnation there arose, from the inspiration of the cloisters, Mysteries and Miracle plays, Moralities and Histories, which were acted on movable stages in the churches, or in the streets. In the Moralities, allegorical personifications of the virtues and vices were introduced and the Histories were long, rambling pieces without much form or object. The first miracle plays were six Latin plays, written by Roswitha, a nun of Gandersheim, in Saxony. The earliest recorded performance of a miracle play took place at Dunstable, in England, in the beginning of the 12th century.

The first regular modern drama was the "Sophonisba," of Trissino, and was acted at Rome in 1515 before Pope Leo X. This tragedy was followed by the dramas of Ariosto of Babbiena and of Macchiavelli, and the drama developed

and extended its field until in 1562 the comedy of intrigue was introduced by Lopez de Vega in Spain, which was imitated and greatly improved by the French. Goethe and Schiller followed in the 18th century. Cornielle produced his tragedy of "The Cid" in 1636; Moliere, the founder of French Comedy, appeared on the stage in 1645; and at last the revelation of a perfect form of the romantic drama, was given the world by Shakespeare. This greatest of all dramatic geniuses was born at Stratford-on-Avon, Warwickshire, about April 23, 1564. In 1586 he went to London, and in 1589 his name appears as a sharer in the Blackfriars' Theatre; twelfth among a commonwealth of sixteen. "Venus and Adonis" was his first work published. It appeared in 1593. The Globe Theatre, with which he is identified, was opened about 1595, and 1604 is the probable date of Shakespeare's retirement from the stage as an actor. He died April 23, 1616. The construction of Shakespeare's plays is so perfect that there was nothing left for succeeding dramatists to improve, and their literary merits are so transcendental that none can hope to equal them. The principal of Shakespeare's contemporaries are Ben Johnson and Beaumont and Fletcher; and following them we have Massinger, Ford and Shirley, with whom the old English drama is closed. Dryden was the leading playwright of the latter half of the seventeenth century, and Lee and Otway bring down the drama to the beginning of the next century, while Gay, Congreve, Cibber, Wycherley, Vanburgh and Farquhar wrote plays which were morally impure, but good specimens of the comedy of manners. Lillo, Moore, Garrick the actor, Goldsmith, the Colmans and Cumberland all produced agreeable comedies; but nothing of a marked kind in the history of the drama of the eighteenth century appears until the time of Sheridan, who is placed at the head of writers of genteel comedy. Mrs. Inchbald, Holcroft, Monk, Lewis and Maturin wrote plays modeled after the German school; and Joanna Baillie, Sheridan Knowles, Bulwer Lytton, Talfourd, Jerrold, Shirley Brooks and Westland Marston bring down the drama to the playwrights of the present day, whose names it is unnecessary to repeat, as they are constantly before us. It is questionable if the American drama has yet been created. Undoubtedly we have an American drama, in so far as plays have been written by American dramatists, whose characters are American and the incidents in which are local; but does it possess those intrinsic literary merits which would preserve it to posterity, as the works of Shakespeare, Goethe and Moliere have been preserved to us? America has, however, given birth to some of the most eminent actors; and as our language is the language of Shakespeare, we have an equal right with the English-speaking people of the older stock to claim him and the other great poets as our common property. The first American playwright was Thomas Godfrey, who published his "Prince of Parthia" in 1765; and on April 16, 1787, a comedy, entitled "Contrast," by Robert Tyler of Massachusetts, was acted at the John street Theatre, New York. The first authentic record we have of plays being acted in America was in the Autumn of 1748, when a theatrical company was formed in Philadelphia, but most probably amateur performances were given long before that. In 1750 this company played in Williamsburg, Va., and in

New York, and shortly thereafter, as will be seen by a perusal of our "Theatrical Chronology," theatres sprang up in various parts of the country.

TRANSFUSION OF BLOOD.

The transfusion of blood, although it may have been practiced earlier than the seventeenth century, was somewhat extensively studied during a period ranging from 1657 to the close of that century. The principal experimenters during this period were Clark, Lower, Harwood and King, in England; Denys, Emmerez, Prevost and Dumas, in France, and Riva and Manfredi, in Italy.

The operation consists in taking blood from the veins of a human being or an animal and immediately injecting it into the circulatory system of another. The operation may be thus described: The subject into whose system the blood is to be transfused, has a slight opening made in a vein (if human, the veins elected is generally in the left arm) sufficient to admit the insertion of a small tube. At the same time, blood is taken from the veins of another subject, and being drawn into an appropriate syringe, is injected through the first mentioned tube into the veins of the former. Great care is necessary to avoid the injection of air bubbles or small clots. The operation must also be performed slowly, as otherwise a fatal shock may be given to an enfeebled patient.

The first experiments of which we have record, were made upon dogs, or other domesticated animals of like species, but they were soon extended to transfusion of blood from an animal of one species into the veins of another of widely different species. Thus the blood of sheep was injected into the veins of dogs without apparent injury.

Denys and Emmerez were the first to attempt the operation upon a human subject. They publicly injected the blood of a sheep into the veins of an idiot upon two occasions. The first operation seemed to result in no injury. In fact, it was thought that visible mental improvement was the result. The second, however, resulted fatally, the patient shortly becoming lethargic and dying in that condition. This took place in 1666. In 1667, one, Arthur Coyn, volunteered to submit to the same operation, and it was performed upon him twice by Lower and King. The first time, ten ounces of sheep's blood were transfused without apparent injury, but on the second trial, unfavorable symptoms resulted. The same thing was done in Italy in 1668, but about that time Denys and Emmerez performed transfusion upon a young German Baron in Paris, who was afflicted with disease of the intestines, who shortly after died from resulting inflammation. This result occurred upon the second operation, the blood transfused being that of a calf.

The French government then proscribed the practice, and the Pope also issued an edict of prohibition. Prof. Harwood, of Cambridge University, strove to bring this practice again into notice in 1785, and was followed by Dr. Blundell about the beginning of the present century, who with Prevost and Dumas, first enunciated the true principles upon which its successful application has been made. He showed that the organic differences in the blood of different species, could not but render admixture harmful, and confined the practice, so far as human subjects were involved, to the transfusion of human blood solely. Blundell kept a dog alive for three weeks with-

out food by transfusing into its jugular the blood of other dogs.

The *Medical Record* also gives an account of a successful operation for the transfusion of blood performed by Dr. Enrico Albanese at the hospital of Palermo, Sicily. A youth, aged seventeen, named Giuseppe Ginazzo, of Cinisi, was received at that establishment on the 29th of September last, with an extensive ulceration of the leg, which in the end rendered amputation necessary, the patient being very much emaciated and laboring under fever. The operation reduced him to a worse state than ever, and it became apparent that he was fast sinking, the pulse being imperceptible, the eyes dull, and the body cold. In this emergency, Dr. Albanese had recourse to the transfusion of blood as the only remedy that had not yet been tried. Two assistants of the hospital offered to have their veins opened for the purpose, and thus, at two different intervals, 220 grammes of blood were introduced into the patient's system. After the first time he recovered the faculty of speech, and stated that before he could neither see nor hear, but felt as if he were flying in the air. He is now in a fair state of recovery.

The operation has been performed also in cases of collapse from cholera with success, the patient in such cases becoming almost instantaneously warmer and exhibiting most marked relief. The evidences are then, on the whole, favorable to the operation when demanded by extreme cases, as it has no doubt, in a number of instances, snatched from the very jaws of death, those who otherwise could not have recovered.

PLAYS were first acted at Rome, 239, B. C.

MYRRH.

This substance is an agreeable perfume and is much valued by Eastern nations for its antiseptic qualities as well as for its delightful odor. It was and is largely used as a component part of incense, and also in the embalming of the dead. In the tombs of Egypt, where the mummies of the great have lain in preservation for ages past, the odor of myrrh is very strong, and we have every reason to believe that it was one of the chief ingredients in the preparation of mummies. It is a gum resin, and occurs in tears of various sizes. They are reddish-brown, semi-transparent, brittle, of a shining fracture, appear as if greasy under the pestle, have a very acrid and bitter taste, and a strong smell. Myrrh flows from the incisions of a tree not well known, which grows in Arabia and Abyssinia, supposed to be a kind of *amyris* or *mimosa*. It consists of resin and gum in the proportions of 36 of the former to 66 of the latter. We use it only as a medicine.

AMBERGRIS.

This singular substance is one among those derived from animal sources that are employed in the perfumer's art, and although its origin would seem to preclude its use by the fastidious, the same objection would equally apply to musk, the product of the civet cat or musk deer, which if not an excretion is a secretion intended probably, as is the offensive liquid ejected by the skunk, as a means of defense. Ambergris, or "gray amber" as its name denotes, is simply and only a portion of the excreta of the sperm whale, *Physeter macrocephalus*, resulting from disease. It is considered

generally to be a result of a morbid secretion of the whale's liver, and is probably produced also by other oceanic mammalia. It is usually found floating on the surface of the sea in those parts of the ocean most frequented by the spermaceti whale; a small barren island off the coast of Yucatan, having received its name of Ambergris from the quantity of that substance found on its shores.

Whale fishers look for it in the intestines of the whale, and its value is so great that whalemen pursue with eagerness the sickly cetaceæ although they promise a scant return of oil. It is amorphous, or in roundish pieces, frequently formed in layers, of a grayish color — whence its name — with streaks of whitish yellow, brown, or black. It has a waxy texture and when warmed emits a pungent odor. It is for this quality it is so highly esteemed. It has been sold for its weight in gold. It is very scarce and seldom appears except as "essence of amber" or "extrait d'ambre," forms of perfumery having this material for their base and bearing a very high price.

Its discovery is not at all new. It is pretty certain it was known as a rare perfume in the fifteenth century, for Sinbad, the sailor, being wrecked somewhere in the Indian Ocean, says:

"Here is also a fountain of pitch and bitumen that runs into the sea, which the fishes swallow, and then vomit up again, turned into ambergris."

It is generally found in small quantities of only a few pounds or perhaps ounces in weight, but large masses have been discovered, one weighing 174 lbs. having been purchased in the East Indies by the Dutch, and a mass of 237 lbs. being obtained by the French East India Company. Lately, however we read that Captain Timothy C. Spaulding, of the bark *Elizabeth* of New Bedford, while coming southwest of Madagascar, struck a very large sperm whale. On opening the whale they had the good luck to discover 285 pounds of ambergris—worth on the spot $20,000.

Another New Bedford whale ship, the *Herald*, brought home 71 lbs. of this substance that sold for $97 per lb.

WAX FRUIT MAKING.

Closely allied to wax flower making is that of wax fruit, some specimens of which are marvellous for their faithful imitation of nature. Here moulding or casting is of more importance than in flower making, seeing that accuracy of form is the chief desideratum. Most kinds of imitative fruit are shaped in double moulds, one for each half, and if the fruit is irregular in its curvatures a tripartite mould may be needed. Say that an orange is to be imitated in wax, a smooth, damp surface of sand is prepared, into which exactly one-half of a good orange is carefully pressed; a cordon or border of tin or stiff paper is built up around it about half an inch distance from the orange on all sides; plaster of Paris, in a cream-like consistency, is then poured into the cell thus made, so as to fully cover the orange; when quite firm enough to handle, this plaster half-mould is taken up and the orange extricated; the orange is turned over in the sand and another half-mould made in a similar way. Whether fruit is cast solid or hollow depends mainly on the size; if large, the mass would be heavy and much wax wasted by solid casting; in this case a core of some rough material is fixed in the

middle of the mould, which gives a cavity to the middle of the fruit.

Soft kinds of fruit, such as plums, cherries, and ripe pears, and some hard and unyielding fruits, require special management to extricate them from the half-mould without injury to the fruit on the one hand or to the mould on the other. Pomegranates, medlars, pine-apples, etc., require moulds in more than two parts. Occasionally, elastic moulds of glue are found advantageous. Generally speaking, the color of the wax employed is tnat of the lightest parts of the fruit, the deeper tints being afterward laid on with brush and pencil. The chief pigments employed are such as burnt and raw umber and sienna, chrome yellow, red lead, Prussian blue, carmine, lake, etc., greens being produced by various admixtures of blue and yellow.

Certain small varieties of fruit, such as grapes and currants, are made of glass bulbs, carefully blown to the proper shape; these are fixed by wax to wire inserted into holes, and are then dipped into melted wax of the proper color, a very thin coating of which gives the proper kind of semi-transparency to the glass, and at the same time a smoothness of surface not inaptly resembling that of the natural fruit. The fastening of the various fruits to imitative stems, leaves, leaflets, etc., is an affair of wires, silken thread, strips of green paper, white flock, arrowroot-paste, gum-mastic, varnish, with other simple materials and tools employed in artificial flower making.

WOOD BENDING.

The use of bent wood for an increasing variety of purposes surpasses the knowledge even of those most familiar with its production. It is used in all departments of business and pursuits of life, wherever man and his products are known. It is as ancient as history, and is found among those in the rudest state of barbarianism. Little is known of the most ancient devices for bending wood, but the oldest patented in England is now nearly a century old, and is used there yet for some purposes. The oldest in the United States was used first in 1794 up to 1821, then patented with but little change. In 1813, at the Woolwich Navy Yard, in England, floor timbers, sixteen inches square, for a man-of-war, were bent over an arc of a circle with a radius of four feet.

MADDER.

The plant known as madder belongs to the genus Rubia, of which there are several varieties, one species being used in dyeing textiles a red color. The root is also used by medical men, and is in great reputation as an emmenagogue. It is extensively cultivated in Smyrna, France, and Holland. Madder is rich in nitrogen, and has been used from the earliest times in connection with several re-agents by the dyer, and especially with indigo. The best cultivated madder comes from Smyrna, and the next in quality from Holland, but some very fine, as well as very poor varieties, are grown in France. The second grade of French is said to give one-third less color than the second grade of Dutch.

A very valuable plant of this specie grows wild in certain sections of South America, which is said to fully equal, and in some respects even excels any kind of European growth.

Dutch madder is first ground in a suitable mill, and is then separated into four distinct grades, known as

crop, umbro, gamene, and mull; each of these being possessed of many different shades of quality. The crop is used for fine reds, and the mull for dark browns, drabs, and dark bottle-greens. The umbro and the gamene are used by woolen dyers for common colors, and for the blue vats, in connection with indigo or other suitable substances. A specie of rubia called mungeet is imported to some extent from the East Indies in bales and belongs to the family of madders. It has long slender roots, the largest of which are about the size of a pipe-stem. The color obtained from this root is similar to that obtained from the regular madder, excepting that it is of a deeper red. This article is sometimes used as a substitute for Dutch madder. When madder is held at a very high price, it may pay to import mungeet; otherwise it is almost entirely neglected.

European madder being put up in casks, the outside layers are more or less damaged by access to the air through the seams between the staves; when sold, therefore, in the various foreign markets, an allowance is made for what is called crust. The injury to the root may be discovered by boring in from the bilge to the centre of the cask; upon drawing out the borer and examining its filling, an estimate can be formed of the average loss, which is usually from ten to twenty-five per cent.

Formerly many blue-dyers were under the impression that madder, by giving out its red dye to the liquor, produced by a union with blue a rich purple color; but this theory, on practical application, has been found to be erroneous.

Madder-reds are usually applied to woolens after they have been fulled, as the soap used in the process of fulling changes the coloring matter if applied previously. Cloths of coarse quality, such as flannels, long baize, etc., are usually colored in this manner. Since the general introduction of lac-dye and aniline-reds, the finer class of fabrics have been dyed after the more modern and improved processes. The properties of these dyes are brilliant and are quite enduring. Lac is relatively cheaper than cochineal, while the cost is not so great as that from madder at fourteen cents per pound.

Madder can be raised in most parts of the United States. Commonly it is raised in gardens, and the root being dried is ready for market. The quality usually raised in the Southern and Middle States is said to be excellent, and about equal to that produced from the second quality of the Dutch crop.

The plant is cultivated as follows, viz:—The land is plowed deeply and harrowed finely, and subsequently thrown up into ridges, in order that it may be exposed to the action and influence of the Winter frosts. Early in the Spring the ridges should be harrowed down, and then plowed to a good depth in a contrary direction from the first furrow. When the land is not perfectly free from weeds it requires additional cultivation. When sufficiently fine and mellow, and in as level a condition as possible, the seeds can be sown, or sets of old plants placed at a distance of five inches apart one way and two feet the other. It requires about thirty thousand plants for an acre. It is of the greatest consequence that the plants be kept free from weeds, the rich earth stirred about the roots. In favorable seasons and in suitable conditions the crop may be rendered fairly profitable

at present prices. It requires three or four years to fully mature this root, when dug sooner it is not so valuable. Madder has of late years been to a considerable extent supplanted as a dye, although the importations are still very considerable.

FIRST MAPLE SUGAR.

The important discovery that sugar can be made from the maple tree, has been attributed to New England, and its date fixed as far back as 1765, in an article which has gone the rounds of the press. This statement has called forth a unanimous, indignant and patriotic protest on the part of the French Canadian press, who claim the priority of discovery. They state that maple sugar was in general use in Canada previous to the Revolution, and long before *Dudley's Register* recorded, in 1765, its first manufacture in New England. Indeed, the Jesuit priest Charleroix, in his History of New France (Canada), wrote as early as 1721 an account of the process by which the sugar was obtained, stating that the sugar was unknown to the Indians, thus favoring its French origin. All honor, then, to the French Canadians for the maple sugar, unless our New England cotemporaries have records to substantiate their claim beyond the year 1721.

HOW MONKEYS ARE CAPTURED.

Monkeys are pretty common, yet, as all the families are remarkably cunning, has it ever occurred to the reader how they are taken? Pitfalls will take a lion, and the famished monarch will, after a few days' starvation, dart into a cage containing food, and thus be secured. But how are monkeys caught? The ape family resemble man. Their vices are human. They love liquor and fall. In Darfour and Senor, the natives make a fermented beer, of which the monkeys are passionately fond. Aware of this, the natives go to the parts of the forest frequented by the monkeys, and set on the ground calabashes full of the enticing liquor. As soon as the monkey sees and tastes it, he utters loud cries of joy, that soon attract his comrades. Then an orgie begins, and then in a short time they show all degrees of intoxication. Then the negroes appear. The few who came too late to get fuddled, escape. The drinkers are too far gone to distrust them, but apparently take them for a larger species of their own genus. The negroes take some up, and these begin to weep and cover them with maudlin kisses. When a negro takes one by the hand to lead him off, the nearest monkey will cling to the one who thus finds a support, and endeavor to go on also. Another will grasp at him, and so on, until the negro leads a straggling line of ten or a dozen tipsy monkeys. When finally brought to the village, they are securely caged and sobered down; but for two or three days a gradually diminishing supply of liquor is given them, so as to reconcile them by degrees to their state of captivity.

CURIOUS FACTS ABOUT TOOLS.

Every mechanic knows that old tools, which have been laid aside or lost for a long time, seem to have acquired additional excellence of quality. Razors, which have lost their keenness and their temper, recover, like mankind, when given time to recuperate. A spring regains its tension when allowed to rest. Farmers leave their

scythes exposed to the weather, sometimes from one season to another, and find their quality improved by it. Boiler makers frequently search old boilers carefully, when reopened for repairs after a long period of service, to find any tools that may have been left in them when last repaired, and if they are found, they are almost invariably of unusually fine quality.

HEIGHT OF TOWERS, ETC.

The altitude of the principal towers, spires, monuments, etc., is as follows, reckoned in feet:

Bunker Hill Monument	221
Leaning Tower of Pisa	190
Milan Cathedral	260
Mosque of St. Sophia, Constantinople	290
Porcelain Tower at Nankin	228
Pyramids of Egypt (highest)	520
Salisbury Spire	410
Solomon's Temple	210
St. Ivan's Tower	300
St. Paul's Church, London	370
St. Peter's Church, Rome	518
Strasburg Cathedral	474
Temple of Belus, at Babylon	666
Tower of Babel	680
Trinity Church, New York	283
Walls of Babylon	350

FURNITURE STUFFS.

Carpets, velvets, damasks, reps, poplins, printed linens and cottons, linen and plain silks, damask silk and silk and woolen damasks, brocatelles, figured and embroidered muslins and laces, fringes, are so many specialties in furnishing stuffs. Until very modern times, says the *Draper*, the materials to choose from were very limited, some of them unsuited to our climate. The introduction and application of reps, with silk and woolen damasks of variegated surface, indicated the first great modern advance. Algerines and woolen reps proceeded to replace, little by little, the figured velvets and the cloths printed with medallions, which had constituted the favorite furnishing stuffs; whilst for curtains, beautiful embroidered muslins were substituted for cottons with printed borders.

It was this country that brought out moreen (1839), consisting of wool with watered or clouded ground, damask wool, and damask wool and cotton. Twelve years later witnessed the production of double-faced reps. Since 1862, woolen poplins have replaced those composed of woolen warp and cotton train. A great proportion of these goods are machine-made. At the present time, furniture silk and woolen poplins, chiefly made by hand, are used to a considerable extent.

The beauty of brocaded silks and satins, now so extensively introduced as coverings and curtains, consists in style and finish as well as in material; the patterns of various devices, principally flowers, being raised upon the surface, so as to have the appearance of being worked by hand; some of these are even worked in gold and silver. In the selection of silk mercery, now supplied for upholstery in multitudinous qualities, shades and colors, not only should the general texture of the article, its regularity of make, selvage, and weight be taken into consideration, but the liability or otherwise to be effected by sunlight, atmospheric influences or gaseous vapors. We need not say that however supple the material and beautiful the surface, its early fading or deterioration from these causes cannot fail to give dissatisfaction to the purchaser, who is too apt to lay the blame on the draper. In short, all upholstery stuffs require great care in selection.

The points of recommendation of silk warp and worsted weft fabrics for furniture, are their richness and durability. It is in the production of arti-

cles in which wool of various kinds is combined with cotton and silk, that the superiority of British manufacturers is most apparent. In these, the skill and enterprise of the manufacturer have been aided by the dyer. The chemical processes required to impart an equable and regular dye to a fabric composed of both animal and vegetable substances, are necessarily varied and intricate, but they are dyed as successfully as silk alone. Witness the Dublin poplins, ever, by the way, coming out with new shades. The remarkable softness to the touch, which distinguishes velvet, due to the pile occasioned by the short pieces of silk thread doubled under the shoot, and the attractive appearance of the surface reflecting different shades according to position, owing to the uniformity and evenness of the pile, render it an attractive article. Figured velvet for hangings and furniture, if of tasteful design and good breadth, is calculated to show to good advantage. We have seen beautiful imitations of white lace on velvet grounds in several varieties.

The savonnerie velvets, made by machine, must be added to the list of varied furnishing stuffs.

The use of pure woolen stuffs for upholstery, tends to diminish both in this and other European countries, but large quantities are exported to South America and the colonies. The more costly specimens of printed cretonnes are chiefly manufactured in France and Germany. Those of Alsace, famous for their excellence, are in much request, not only for coverings but screens. The rich continental tissues present, with the most delicate surface, most skillful combinations of color, brilliant hues in flowers, birds, butterflies, and other devices on which the eye can rest without weariness from the repose induced by the harmony of the tint. In no tissues has more skill been exhibited on the part of the designer and dyer. Piece dyed and printed table covers of wool, and silk combined with wool, have necessarily a large sale; but what strikes us as according with a higher degree of taste, when the purpose is merely decoration, is the embroidery of plain covers at the corners with colored silks. No textile furniture article, if we except curtains, shows to better advantage, if rich and appropriate, than a table cover. A considerable continental supply of those we refer to, is always on hand among London warehousemen. Fancy linen damask for covering furniture, contribute to the serviceable varieties of tissues available for the same purpose. We have inspected specimens of these made in close imitation of silk. In the finer descriptions, much skill is displayed. We may properly include under our heading, damask linen table cloths and napkins, the sale of which depends on quality far more than design. As it is important for a draper dealing in what are known as embroidered lace curtains, to be technically correct in his designations, we may mention that the term embroidery is not much used in connection with the Nottingham lace trade, the handwork applied being in the working round of the outline, which is called "running," and in the filling up of the interior parts, which is termed either "fining" or "open working." Owing to the cheapness of labor in Switzerland, the Swiss are enabled to place upon our own and other foreign markets, at moderate prices, real hand-embroidered curtains.

In embroidered coverings of cushions, whether trailed over or wreathed

round with twigs, leaves, flowers, or otherwise adorned, care should be taken in purchasing stock that those chosen do not present rough broad welts. Rich and heavy embroidery frequently unfits the stuffs on which it is worked for ordinary use; what will commonly be found most pleasing, if embroidery be demanded for cushion surfaces, are corners prettily sprinkled with lively-looking flowers.

Moreens for window-curtains and bed-furniture might be more extensively disposed of if the practice of upholsterers was followed. As colors and patterns are much a matter of changeable taste, and as in respect to upholstery stuff there is not usually that haste for filling an order which attends on dress goods, it would be well if in addition to a choice current stock, inclusive of such as are adapted to ladies dresses, the drapers were ready to submit a series of book-patterns of hues and shades readily obtainable from the London warehousemen. These might be presented, too, in combination with fringes or traced embroidery, judiciously selected. Of colored mixed stuffs their chief application in the department of which we are treating, is for window curtains. Many makers turn them out for this purpose with great brilliancy and force of color. We have seen of late years a great advance in beauty and appropriateness of design and excellence of manufacture.

A large business is done by many retail drapers in furniture fringes. In addition to the well known varieties of plain head, open head, star head, loop bullion, country and town bullion, German cotton fringe, and cotton and worsted bullion, choice novelties are constantly being introduced in London, especially from the continent. The same may be said of silk and worsted chair gimps, curtain-holders, bell-pulls, and float and orris laces.

As guiding to a judicious selection of carpets for stock, so far as patterns are concerned, we may observe that there should be a contrast between the centre of a carpet and its border, a contrast obtained not only by a border darker than the body of the carpet, but also by ornamental details smaller and more closely treated, and with greater fullness of color than the design of their central portion. Such a treatment may be reversed, and the details of the centre be smaller than those of the body and its color lighter, or variety may be obtained by other methods, but where there is no such contrast the result is indistinctness and want of piquancy. Cocoa and manilla hemp matting, plain and printed felts, and oilcloths, have a large consumption, and should not be overlooked by the retail draper possessing ample storeroom. Oilcloths are made so perfect as to occasion no inconvenience from the most prolonged and intense heat. Various additional materials have been of late years introduced, such as cork matting, oriental fibers, and combinations of gutta-percha, allowing of any amount of ornamentation.

TO DRIVE RATS AWAY WITHOUT POISON.

There are three methods: First, the old French plan; this is followed chiefly in Paris by men who make it a special business. They take a deep tub with water on the bottom, and a little elevation in the middle like an island, on which is only place for just one rat to sit on. The top is covered and has a large balanced valve, open-

ing downward; on the middle of this valve, a piece of fried pork or cheese is fixed, and when a rat walks on it to get the cheese, the valve goes down, drops the rat in the water, and moves back in position. A road is made from a rat-hole to the top of the tub, by means of a piece of board rubbed with cheese, so as to make the walk attractive for the rats. In the course of a single night, some ten, twenty, or even more rats may go down, and if the island was not there, they would be found most all alive in the morning quietly swimming round; but the provision of the little island saves the trouble of killing them, because their egotistic instinct of self-preservation causes them to fight for the exclusive possession of the island, on which, in the morning, the strongest rat is found in solitary possession; all the others being killed and drowned around him. Second, the New York plan, invented by one of our friends. The floor near the rat hole is covered with a thin layer of moist caustic potassa. When the rats walk on this, it makes their feet sore; these they lick with their tongues, which makes the mouth sore; and the result is that they shun this locality, not alone, but appear to tell all the rats in the neighborhood about it, and eventually, the house is entirely abandoned by them, notwithstanding the houses around may be teeming with rats. Third, the Dutch method; this is said to be used successfully in Holland; we have, however, never tried it. A number of rats are left together to themselves in a very large trap or cage, with no food whatever; their craving hunger will cause them to fight, and the weakest will be eaten by the strongest. After a short time the fight is renewed, and the next weakest is the victim, and so it goes on till one strong rat is left. When this one has eaten the last remains of any of the others, it is set loose; the animal has now acquired such a taste for rat-flesh, that he is the terror of ratdom, going round seeking what rat he may devour. In an incredibly short time the premises are abandoned by all other rats, which will not come back before the cannibal rat has left or has died.

MEN OF LITERARY GENIUS.

Tasso's conversation was neither gay nor brilliant. Dante was neither taciturn nor satirical. Butler was sullen or biting. Gray seldom talked or smiled. Hogarth and Smith were very absent minded in company. Milton was very unsociable, and even irritable when pressed into conversation. Kirwan, though copious and eloquent in public addresses, was meager and dull in colloquial discourse. Virgil was heavy in conversation. La Fontaine appeared heavy, coarse and stupid; he could not speak and describe what he had just seen, but then he was the model of poetry. Chaucer's silence was more agreeable than his conversation. Dryden's conversation was slow and dull, his humor saturine and reserved. Corneille, in conversation, was so insipid that he never failed in wearying; he did not even speak correctly that language of which he was such a master. Ben. Johnson used to sit silent in company and suck his wine and their humors. Southey was stiff, sedate and wrapped up in aceticism. Addison was good company with his intimate friends, but in mixed company he preserved his dignity by a stiff and reserved silence. Fox, in conversation never flagged, his animation and variety

were inexhaustible. Dr. Bently was loquacious, so also was Grotius. Goldsmith "wrote like an angel and talked like poor Poll." Burke was entertaining, enthusiastic and interesting in conversation. Curran was a convival deity.

POTTING PLANTS.

The mould for potting should be light and loamy, the fertilizing material used being well decayed. If the soil is rich of itself, it is better to be either very sparing with the fertilizer or to dispense with it altogether. In the bottom of the pot, place several small, broken pieces of crockery, or similar material, to assist the drainage; and in setting the plant, be careful to keep it well down in the pot and to press the mold moderately around the roots. The surface of the mold should be about half an inch below the level of the top of the flower pot. Slips should be planted close to the sides of the pot, and in small pots.

When a plant becomes pot bound, that is, when the roots have become matted around the sides and bottom of the pot, the plant, as soon as it has ceased blooming, should be repotted in a larger pot. It is not necessary to remove any of the mold from the roots, but simply to fill in the space in the larger pot with new and rich mold.

Plants kept in the windows should be turned every morning, or the light, striking on one side only, will draw the plant to that side, so that all its branches and leaves will turn towards the window. The water in the saucers should never be applied to the plants. In cutting slips of any plant, always choose the youngest branches; and cut off the slip at the junction of a joint or leaf, since the roots shoot more readily from such joints. If you follow these directions and put sufficient sulphate of ammonia to just taint the water applied to your plants, you may cultivate with success almost any plant, even though you are an entire novice.

SHRINKING OF SEASONED TIMBER.

The various kinds of oak, and some other kinds of valuable timber, will shrink more or less every time the surface is dressed off even a small fraction of an inch. Wheelwrights, accustomed to work in oak, are well aware of this fact, and a correct appreciation of it often enables them to turn out work of a superior character, even of ordinary materials, by first blocking out the pieces roughly, then allowing the timber to season, and afterwards working the various parts by degrees, as the seasoning process becomes more and more complete. White oak spoke timber, for example, may be allowed to remain in rough state for half a score of years, under shelter, without becoming seasoned so thoroughly that the timber will not shrink after the spokes have been dressed out.

Carriage wheels have often been made of the choicest quality of oak timber after every spoke had been seasoned for several years, and, to the great surprise of the wheelwright, every spoke would work in the joints before the vehicle had run three months. The defect in such instances could not be attributed to inferior timber, nor to perfunctory workmanship; but simply to this one circumstance — that the parts of the wheels were put together before the timber had ceased to shrink.

To prove that the best quality of

oak will shrink, after a spoke has been dressed out, let a tenon be made on one end, and be driven immediately into a mortise; after a few days' exposure in a warm workshop, the spoke may be withdrawn with little difficulty. The same fact will hold good in the manufacture of woodwork of any kind where oak is employed for tenons. In order to make joints that will never start, the piece on which the tenons are to be made should be dressed over several times, until the shrinkage has ceased. Then let the tenons be made. After these have shrunk, while exposed to the drying influence of a warm workshop, the spokes, or other parts, may be driven into their respective places, with the assurance (especially if they are dipped in oil-paint previous to driving) that the timber will shrink no more.

Many kinds of farming implements, in the manufacture of which, oak and ash are employed, render very unsatisfactory service, simply because the seasoned timber was not allowed to shrink before the tenons were driven into the mortises. In like manner, oak chairs, and other oak furniture, will frequently shrink to such an extent that the pommels, rungs, dowel pins and banisters will all work loose, if the precaution we have described is not observed.

A Dog's Bed.—The best bed which can be made for a dog, consists of dry newly-made deal shavings; a sackful of these may be had at almost any carpenter's shop. The dog is delighted in tumbling about in them until he has made a bed to suit himself. Clean wood shavings will clean a dog as well as water, and fleas will never infest dogs that sleep upon fresh deal shavings. The turpentine and resin or new pine soon drive them away.

PROPORTIONATE PROPERTIES OF FOOD.

100 parts of each.	Water, etc.	Muscle making.	Heat & Fat making.
Apples	84.0	5.0	10.0
Barley	14.0	15.0	68.8
Beans	14.8	24.0	57.7
Beef	50.0	15.0	30.0
Buckwheat	14.2	8.6	75.4
Butter		....	all
Cabbage	90.0	4.0	5.0
Cheese	10.0	65.0	19.0
Chicken	46.0	18.0	32 0
Corn	14.0	12.0	73.0
Cucumbers	97.0	1.5	1.0
Eggs, white of	53.0	17.0	none
Eggs, yolk of	79.0	15.0	27.0
Lamb	50.5	11.0	35.0
Milk, cows	86.0	5.0	8.0
Mutton	44.0	12.5	40.0
Oats	13.6	17.0	66.4
Peas	14.0	23.4	60.0
Pork	38.5	10.0	50.0
Potatoes	75.2	1.4	22.5
Rice	13.5	6.5	79.5
Turnips	94.4	1.1	4.0
Veal	68.5	10.1	16.5
Wheat	14.0	14.6	69.4

EARLY METALLURGY.

Iron was not in common use till long after the introduction of copper. It is far more difficult to procure, because it is not met with in the native state, and the fusing point is very high. The metallurgy of iron is more complex than that of copper, and when obtained, it is a more difficult metal to work. According to Xenophon, the melting of iron ore was first practiced by the Chalubes, a nation dwelling near the Black Sea, hence the name *chalups*, used for steel, and hence our word chalybeate, applied to a mineral water containing iron. Steel was known to the ancients, but we do not know by what means it was prepared; it was tempered by heating to redness, and plunging in cold water. According to some *kuanos*, mentioned by Homer, was steel; but Mr. Gladstone prefers to conclude that it was bronze. Iron was known at least 537 B. C. It was coined into money by the Lacedæmonians, and in the time of Lukeourgos was in common use. It was used in the time of Homer for certain cutting instruments,

such as woodman's axes, and for plowshares. Its value is shown by the fact that Achilles proposed a ball of iron as a prize for the games in honor of Patroklos. Neither iron, money nor iron implements of great antiquity have been found, because, unlike the other metals of which we have spoken above, iron rusts rapidly, and comparatively soon disappears. No remains of it have been found in Egypt, yet Herodotus tells us that iron instruments were used in building the pyramids; moreover, steel must have been employed to engrave the granite and other hard rocks, massive pillars of which are often found engraved most delicately from top to bottom with hieroglyphics. Again, the beautifully engraved Babylonian cylinders and Egyptian gems, frequently of cornelian and onyx, must have required steel tools of the finest temper. We have no record of the furnaces in which iron ore was smelted, but we know that bellows were in use in the fifteenth century B. C., in Egypt, and some crucibles of the same period are preserved in the Berlin Museum. They closely resemble the crucibles in use at the present day. The native Indians prepare iron from hematite at the present time by equally primitive bellows, which indeed resemble the above very closely, and which, without doubt, have been unaltered for centuries. A small furnace is rapidly constructed of clay, and into the bottom of this, two nozzles are introduced; these are connected with the bellows by bamboo tubes. The bellows consist of cup-shaped bowls of wood, covered with goat skin above, and connected with the bamboo below. In the center of the goat skin cover a round hole is cut; the blower places his heel upon this, which is thus closed, while, at the same time, the skin is depressed, and a blast is driven from the tube; then he steps upon the second skin, and thus a continual blast is kept up. The bent bamboo and string is for the purpose of raising the goat skin cover of the bellows after depression, which is accomplished by the Egyptian bellows by a string raised by the hand. A piece of hematite is introduced with some charcoal, and after the lapse of some time, it is reduced by the carbonic oxide to a spongy mass of iron. Undoubtedly a crude furnace and appliance of this nature was used by the first melters of iron.

CONSERVE OF ROSE LEAVES.

Gather the leaves of any sweet-scented, fresh, full-blown roses, early in the morning, while the dew is still upon them. Have ready provided, equal quantities of cloves, mace and nutmeg. Sprinkle with salt, then with the spices prepared. Take a box of any kind that is rather shallow, place in the bottom a layer of rose leaves, sprinkle with salt, then with the spices prepared; then put in another layer of rose leaves, then spices, etc., until the box is filled. Lastly, tie on tightly a cover of sheer Swiss muslin, and expose to the sun daily until perfectly dry. You may then pack the conserve in pretty china bottles, with wide mouths but close stoppers, and you will be provided with a delicious perfume, whose sweetness will not evaporate for years. It is pleasant either to have on one's parlor mantel or chamber toilette table. As a perfume for mouchoir cases or scent bags it is unrivaled. Let the housekeeper also try laying it among the stores on the shelves of her linen closet.

JOHN ERICSSON.

John Ericsson, an eminent Swedish engineer, inventor of the caloric engine, was born in the province of Vermeland in 1803. After he had served several years in the army, he removed to England about 1826 and made unsuccessful experiments with an engine which he proposed to run without steam. He produced in 1829 a locomotive which ran fifty miles an hour on the Manchester Railway. About 1833 he exhibited in England a caloric engine which attracted much attention among scientific men. He also invented the important application of the screw or propeller to steam navigation, and about 1840 came to the United States where he received aid from government in reducing his inventions to practice. He built the iron-clad steamer Monitor, which successfully opposed the Merrimac in Hampton Roads, March 9th, 1862.

ELI WHITNEY.

Eli Whitney, the inventor of the cotton-gin, was born at Westborough, Worcester county, Mass., Dec. 8th, 1765. He displayed great mechanical ingenuity in his early youth, graduated at Yale College in 1792 and went to Georgia to teach school. He became an inmate in the household of General Greene's widow, near Savannah, where about the end of 1792 he invented the cotton-gin for separating the cotton from the seed. In May, 1793, he formed with Phineas Miller a partnership for the manufacture of the gins. Before he had obtained a patent for his invention, some persons broke open his premises by night and carried off his model machine. He was thus defrauded of his just reward and was involved in much trouble by the infringements of his patent. When he prosecuted those who infringed his patent, the juries of Georgia decided for the defendants. The Legislature of South Carolina paid him fifty thousand dollars for his patent right about 1804. Despairing of gaining a competence by this invention, he engaged in the manufacture of fire-arms near New Haven in 1798. He made great improvements in the construction of fire-arms and acquired an independent fortune in that business. He married in 1817, a daughter of Judge Pierpont Edwards.

Robert Fulton expressed the opinion that Arkwright, Watt, and Whitney were the three men that did most for mankind of any of their contemporaries. He died at New Haven in January, 1825.

BENJAMIN FRANKLIN.

This eminent American philosopher and statesman was born at Boston, Mass., January 17th, 1706. He was the youngest son and fifteenth child of a family of seventeen children. His father, Josiah Franklin, emigrated from England to America in 1682. He followed the business of tallow-chandler and soap-boiler. Benjamin when only ten years old was employed in his father's shop in cutting wicks, going errands, etc.; but soon becoming disgusted with the monotonous routine of his duties he conceived a strong desire to go to sea. To prevent this his father bound him apprentice to his brother James, who was a printer. He now had free access to books for which he had evinced a fondness, even from infancy. He himself says he could not remember the time when he did not know

how to read. To gratify his thirst he would often sit up the greater part of the night. During his apprenticeship he made occasional anonymous contributions to a paper published by his brother, and once had the gratification to hear his articles warmly commended by some gentlemen who called at the office, and who little imagined him to be the author. He did not, however, neglect his duties as a printer, and he became in a few years well skilled in his trade; but he and his brother could not agree. At length, when seventeen years of age, young Franklin left Boston without the knowledge of his relatives, embarking in a vessel bound for New York, whence he proceeded partly by water and partly on foot to Philadelphia. Here he obtained employment as a journeyman printer. In the following year, encouraged by the promise of assistance from a gentleman in Philadelphia, he resolved to set up business for himself. With this view he went to England in order to purchase type and other materials necessary for carrying on the trade. But failing to receive the aid which he had expected from his pretended friend, he was obliged to work as a journeyman in London where he remained more than a year. He returned in 1726 to Philadelphia, and in 1729, with the assistance of some friends, he established himself in business. The next year he married Miss Deborah Reed, with whom he had become acquainted in Philadelphia before he went to England. In 1729 he became the editor and proprietor of a newspaper (the Pennsylvania Gazette) which his talent for writing soon rendered very popular and profitable. To him is due the credit of founding the Philadelphia Library which was commenced in 1731 and is now one of the largest in the United States. By his talents, prudence and integrity, he continued to rise in the estimation of the community in which he lived until he was deemed worthy of the highest honors which his country could bestow. In 1752 he made the important and brilliant discovery of the identity of lightning with the electric fluid by means of a kite. Some letters, giving an account of his first experiment, were sent to England to his friend, Mr. Collinson, who had them read before the Royal Society; but they attracted little attention. One paper, says Franklin in his autobiography, which I wrote for Mr. Kinnessley on the sameness of lightning with electricity, was laughed at by the connoisseurs. These papers were not even thought worthy to be printed in the Transactions of the Society. At the suggestion of Dr. Tothergill they were published in a pamphlet by themselves. A copy having fallen under the notice of the celebrated Count de Buffon, it was at his instance translated into French and excited great attention on the continent. The subject was brought again before the notice of the Royal Society, "and they soon made me," says Franklin, "more than amends for the slight with which they had before treated me." Without waiting for any application to be made on his behalf, they chose him a member of their body and voted that he should be excused from the customary payments on admission (amounting to twenty-five guineas); they also bestowed upon him the Copley gold medal (dated 1753) and afterwards furnished him with their transactions without charge. Before he left England in 1762 the degree of Doctor of Laws was conferred upon him by the Universities of Edinburgh and Oxford.

Towards the close of 1776 he was sent as ambassador to the court of France. He arrived in Paris on the 21st of December. To Franklin is due the principal, if not the sole, credit of effecting between France and the United States the Treaty of Alliance, the stipulations of which were so eminently favorable to the latter country. This treaty, signed at Paris the 6th of February, 1778, may be said to have secured the independence of the American colonies. He died in Philadelphia, on the 17th of April, 1790, aged eighty-four years. His remains are entombed in the cemetery of Christ Church burying-ground at the corner of Fifth and Arch streets. Dr. Franklin says in his will, "I wish to be buried by the side of my wife if it may be, and that a marble stone be made by Chambers, six feet long , four feet wide, plain, with only a small moulding round the upper edge and this inscription: Benjamin and Deborah Franklin 1790, to be placed over us both." Strictly to the letter this will was carried out, and there repose the ashes of this great man. There is, somehow, a majesty in a modest epitaph, that sounding titles and classic quotations cannot attain.

ARKWRIGHT.

Sir Richard Arkwright was an inventor whose ingenuity contributed greatly to the prosperity of Great Britain. He was born at Preston, Lancashire, in 1732, and was a barber in his youth. He is the reputed inventor of a machine for spinning cotton which produced an immense extension of the cotton manufacture in the British empire. He set up the machine at Preston in 1768 and obtained a patent for it in 1769, about which date he formed a partnership with Need and Strutt of Nottingham. In 1771 they built a spinning-mill on the Derwent at Cromford, which was moved by water-power; this enterprise was very successful. He became the proprietor of other cotton-mills and controlled the market of cotton yarn for some years. His right to the patent was contested and a verdict was given against him in 1781; but his business continued to prosper. Arkwright is celebrated not only as an ingenious inventor, but also as the founder or pioneer of the factory system. He was a man of wonderful energy and perseverance. He was knighted by George III in 1786. Died in 1792, leaving a large and valuable estate.

ELIAS HOWE.

Elias Howe was born at Spencer, Mass., about 1819. While employed as a machinist he made many experiments for the invention of a sewing-machine and about 1844 entered into a partnership with Mr. George Fisher, of Cambridge, Mass., who agreed to give him pecuniary assistance on condition of becoming proprietor of half the patent. In April, 1845, he finished a machine which in esssential points is esteemed by competent judges equal to any that have succeeded it. He obtained a patent in 1846. His invention not meeting in the United States with the success which he had anticipated, he resolved to visit England. He resided several years in London in great destitution and returned in 1849 without having succeeded in making known the merits of his invention. Meanwhile the sewing-machine had been brought into general notice and favor, various improvements having been added by Isaac Singer. Howe

instituted a law-suit which was decided in his favor in 1854. One of the most important of Mr. Howe's patents was for the eye in the point of the needle. The royalty for this patent alone which was paid Mr. Howe from other manufacturers was a princely sum. Soon after the breaking out of the rebellion in 1861, Mr. Howe raised and equipped at his own expense a regiment, in which he served as a private, until ill health compelled him to resign.

SIR HUMPHREY DAVY.

Sir Humphrey Davy who was one of the most eminent chemists that Great Britain has produced, was born at Penzance, in Cornwall, December 17, 1778. His father was a carver of wood. Endowed by nature with an ardent and fertile imagination, he early manifested a decided taste for works of fiction and especially for poetry. It is stated that when about eleven years old he commenced an epic poem of which Diomede, the son of Tydeus, was the hero. When he was sixteen (1795), he lost his father. Not long after, Gregory Watt, son of the celebrated James Watt, visiting the west of England for his health, became a lodger in the house of Mrs. Davy, the mother of Humphrey. A warm friendship, the result of congenial tastes, sprang up between the young men and appears to have had an important influence in directing the studies and determining the subsequent career of Davy. In 1798 he became associated with Dr. Beddoes in the Pneumatic Institution which the latter had founded at Bristol. In the following year the young chemist gave to the world his first contributions to science, viz: 'Essays on Heat and Light,' with a 'New Theory of Respiration,' etc., (these essays forming part of a volume published by Dr. Beddoes). His Researches, Chemical and Philosophical, chiefly concerning nitrous oxide and its respiration, appeared in 1800, and attracted great attention in the scientific world. He was the first to discover and make known the peculiar properties of nitrous oxide gas. In 1801 he gave his first lecture before the Royal Institution (London) in which he was the following year appointed professor. As a lecturer he was eminently successful. It is said that after his sudden rise to distinction he occasionally betrayed a spirit of arrogance towards younger aspirants to fame. In 1812 Davy was knighted, and shortly afterwards he married Mrs. Apreece—a widow, who possessed, with many accomplishments, a considerable fortune. He was made, in 1818, a baronet, in consideration of the great services which he had rendered his country and mankind—among which one of the most important was his invention of the safety-lamp. In 1820 he was chosen president of the Royal Society and for seven successive years was elected to the same office—which, however, in 1827, he was compelled to resign on account of his health. He died at Geneva in May, 1829.

PETER COOPER.

Peter Cooper was born in the city of New York, Feb. 12, 1791. His father was a lieutenant in the war of the Revolution, after the close of which he established a hat manufactory, in which his youthful son Peter aided to the extent of his strength. During his youth, his father's undertakings being attended with little success, Peter had to work very hard. He

attended school only half of each day for more than a year, and beyond the humble knowledge thus gained, his acquisitions are all his own. At the age of seventeen he was placed with John Woodward to learn coachmaking, and served out his apprenticeship so much to the satisfaction of his master, that he offered to set him up in business, which Mr. Cooper declined. He successfully followed his trade; and subsequently the manufacture of patent machines for shearing cloth, which were in great demand during the war of 1812; the manufacture of cabinet ware; the grocery business in the city of New York, and finally engaged in the manufacture of glue and isinglass, which he has carried on for more than thirty years. Mr. Cooper's attention was early called to the great resources of this country for the manufacture of iron, and in 1830 he erected extensive works at Canton, near Baltimore. He erected subsequently a rolling and wire mill in the city of New York, in which he first successfully applied anthracite to the puddling of iron. In 1845, he removed the machinery to Trenton, N. J., and erected the largest rolling mill then in the United States, for the purpose of manufacturing railroad iron, and at which, subsequently, he was the first to roll wrought iron beams for fire-proof buildings. While in Baltimore, Mr. Cooper built after his own designs the first locomotive engine that was turned out on this continent, and it was operated successfully on the Baltimore and Ohio Railroad, thus identifying his name with the early history of railroads. Having taken great interest also in the extension of the electric telegraph, he was chosen President of the New York, Newfoundland and London Telegraph Company. Mr. Cooper was one of the earliest and most persistent advocates of the present free school system, but finding that no common school system could supply a technological education, he determined to establish in his native city an institution in which the working classes could secure that instruction for which he, when young and ambitious, sought in vain. Accordingly, the "Union for the Advancement of Science and Art," commonly called the Cooper Institute, was erected in New York City; which building covers an entire block and cost over $500,000. This celebrated institution and its objects are familiar to our readers.

As an inventor, Mr. Cooper is not generally known to the American public. Nevertheless, he possesses inventive talent of a high order. A recent summary of his inventions, published in the New York *Herald*, states that among his very earliest inventions was a self-rocking cradle. After he was married, and a cradle became one of the necessities of his household appointments, they were too poor to keep a servant, and the result was that he was called upon to rock the cradle with inconvenient frequency. He therefore invented a self-rocking cradle, and not only that but a fan attachment to fan the infant and keep off the flies, and last, and not least important of all, a diminutive calliopean arrangement to soothe with its sweet harmonies the infant to repose. He took out a patent for this and sold it to a Yankee. When a boy at home, he ripped up an old shoe and, discovering how it was made, soon made lasts and shoes for the family. He made a machine for grinding plate glass of any size to a perfect plane. During his apprenticeship he made a machine for making hubs of carriages

similar to those now in use. Another of his inventions is a cylindrical machine for puddling iron and for reducing ore and pig metal to wrought iron, an invention somebody else has just brought out in England, and is making a fortune from. Twenty-two years ago he filed a caveat and specifications for this invention. There is, in fact, scarcely any end to his inventions. He also — as long ago as when an apprentice — invented a process of utilizing condensed air as a propelling power. At one of these experiments at Fulton ferry—that is, where Fulton ferry is now — the great Fulton, who made the first steamboat, was present, and expressed himself highly pleased with the result. Fifty-seven years ago he made a model of a mowing machine, embracing the principle of mowing machines now in use.

It was largely owing to his perseverance, and readiness to risk his fortune that oceanic telegraphy was successfully introduced.

THOMAS BLANCHARD.

Thomas Blanchard, who was the well known inventor of the lathe for turning irregular forms, was born in Sutton, Worcester county, Mass., June 24, 1788. From a strong bias for mechanical employments, he joined his brother, who was engaged in the manufacture of tacks by hand, a very slow and tedious process, and at the age of eighteen commenced his invention of a tack machine. It was six years before he could bring it to the desired perfection. Finally, so effective was the machine, that by placing in the hopper the iron to be worked, and applying motive power, 500 tacks were made per minute, with better finished heads and points than had ever been made by hand. For this machine, Blanchard secured the patent and sold the right to a company for $5,000. About this time various attempts were made in several of the United States armories to turn musket barrels with a uniform external finish. Mr. Blanchard undertook the construction of a lathe to turn the whole of the barrel from end to end by the combination of one single self-directing operation. He succeeded perfectly in his invention, and this remarkable machine, with modifications and improvements, is in use in the national armories as well as in England; and in various forms is applied to many operations in making musket stocks, such as cutting in the cavity for the lock, barrel, ramrod, butt plates, and mountings, comprising, together with the turning of the stock and barrel, no less than thirteen different machines. Mr. Blanchard was also interested at an early day in the construction of railroads and locomotives, and in boats so contrived as to ascend the rapids of the Connecticut, and rivers in the Western States. He has taken no less than twenty-four patents for different inventions. He died at Boston, April 17, 1864.

SAMUEL COLT.

Col. Samuel Colt, was born at Hartford, Conn., July 19, 1814, and educated in his own native city. When a child he preferred the workroom to the school-room. He remained in his father's factory from the age of ten to fourteen when he was sent to school at Amherst, Mass., but ran away from the school, and, in July, 1829, shipped as a boy before the mast on an East India voyage. On his return, he served a short apprentice-

ship in a factory at Ware, Mass., in the dyeing and bleaching department, where he learned something; after which, under the assumed name of Dr. Coult, he traversed every State and most of the towns in the Union and British North America, lecturing on chemistry. In this way he earned considerable money, which he devoted to the prosecution of the invention of his revolver, the germ of which he had already devised while on his voyage to Calcutta. The first model of his pistol, made in wood, in 1829, while a sailor boy, is still in existence. At the age of twenty-one, he took out his first patent for revolving fire-arms. Before obtaining his patent here, he visited France and England and secured patents there. He returned to the United States and succeeded in inducing some New York capitalists to take an interest in the invention, and a company was formed in Paterson, N. J., in 1835, with a capital of $300,000 under the name of the Patent Arms Company. The revolvers were first introduced into use in the Florida War of 1837. In 1842 the Patent Arms Company were forced to suspend. The Mexican War commencing in 1847, General Taylor sent Captain Walker of the Texan Rangers to procure a supply; there were no arms to be had, not even could he obtain one to serve as a model, so that he was compelled to make a new model, which he did with several improvements. The first thousand were made at Whitneyville, Conn. Other orders immediately following, Mr. Colt procured more commodious workshops at Hartford, and commenced business on his own account. The demand for revolvers greatly increasing, and more room and greater facilities being required, he purchased a tract of meadow land south of Mill River, within the limits of the city of Hartford, surrounded it with a dyke or embankment about two miles in length, one hundred and fifty feet at the base, from thirty to sixty at the top, and from ten to twenty-five feet in height. He erected within this his armory, consisting of two main buildings, with others for offices, warerooms, etc., in which armory he could manufacture one thousand fire-arms per day. He also manufactured the machinery for making these fire-arms elsewhere, and supplied a large portion of the machinery for the armory of the British Government at Enfield, England, and the whole of that for the Russian Government at Tula. The entire expenditure upon his grounds and buildings amounted to more than $1,000,000. He did not forget the comfort of his workmen, having good dwellings provided for them, besides a public hall, a library, courses of lectures, concerts, etc. Mr. Colt subsequently invented a submarine battery of great power, and was one of the first to lay a submarine cable. He amassed an immense fortune in his manufacture of arms; and died in 1861.

ISAAC MERRITT SINGER.

This eminent mechanician died at his residence at Old Paignton, near Torquay, England, on the 23d day of July, 1875, in the sixty-fourth year of his age. It rarely happens that a great mechanical inventor permanently identifies his name with the useful inventions he gives to the world. The men of talent too often seize upon and carry off the fame which properly belongs to the men of genius. Still more rarely does it occur that the meritorious inventor secures

the pecuniary rewards which justly pertain to the highest efforts of the mind.

The subject of this notice was so fortunate as to achieve, in both respects, a grand success. His name and reputation will be perpetuated by a great manufacturing corporation, whose beneficial operations extend over the whole civilized world, and he died in the possession and enjoyment of a colossal fortune. His father was a German, a millwright by trade; his mother a native of Rensselaer county, New York, where the future inventor was born. At an early day the family removed to Oswego, but the father met with little success in his business, and the son, when about twelve years of age, with very imperfect school education and no money, departed from a home to which he never returned.

From that time forth, he fought the battle of life alone. He soon turned his attention to mechanical work, and maintained himself as a machinist, but he never served any regular apprenticeship, and never pretended to be an accomplished artisan. His mind naturally employed itself about novel means of reaching important results, and for many years, while engaged in inventions, it was his practice to employ the simplest materials, such as a steel wire bent to some peculiar shape, or a piece of sheet iron cut to some strange form, or a pine stick curiously whittled with a pocket knife, to elucidate the principles of some of the most useful and curious mechanical devices. The inventions being thus made, and the method of operation distinctly shown, any skilled artisan readily put them into permanent form. At one time Mr. Singer was engaged in the employment of the Messrs. Hoe, in the city of New York, as a machinist, and then devoted his leisure hours to study for the stage. He enjoyed the acquaintance, and, to a limited extent, the instruction of Placide, Povey, Clarke and others, who then adorned the stage of the old Park theatre.

During several years he was a theatrical manager, and gave frequent representations of plays in the interior cities of Ohio, Pennsylvania, and New York. In a certain line of characters, he is said to have acted with much success. To the close of his life he had an ardent love for theatricals and music, and in the splendid mansion, which he had built within the last few years, a theatre, complete in all its appointments, was included.

While he was still a young man he invented a steam drilling machine, which was used with much advantage in the construction of various railways and canals. Subsequently he invented a machine for carving wood, metals, or marble. While endeavoring to introduce this invention to public notice and use, his attention was casually directed to the sewing machine. At that time (A. D. 1850) though several patents on sewing devices had been granted in this and other countries, no practical machine capable of profitable employment to do ordinary work had ever been produced.

Up to that time sewing machines had been experimental merely and had failed to be useful. In eleven days the first Singer sewing machine was invented and built complete. It contained much that was new and useful. Subsequent improvements, for which numerous patents were obtained, added greatly to the value of this machine; but it was successful and profitable from the beginning to all concerned in it and established the

reputation of the inventor and secured him a vast fortune. In 1860, Mr. Singer retired from the active management of business, and from that time until his death he resided mainly abroad. After several years' residence in Paris, he went, with his family, to England, and finally purchased an estate and settled down at Old Paignton, near Torquay, in Devonshire. The last years of his life were devoted to the improvement of that property, where he dispensed a liberal hospitality, and to the poor of that neighborhood his death will be a severe bereavement.

HENRY BURDEN.

Inventor of the Horse-shoe Machine.

Henry Burden, an inventor and mechanic, was born at Dunblane, Scotland, April 20, 1791. His father was a farmer, and it was while a youth engaged on the farm that the son gave evidence of inventive genius, by making with his own hands labor-saving machinery from the roughest materials, and with but few tools and no models. The first marked success was in constructing a threshing machine. He afterwards engaged in erecting grist-mills and making various farm implements. During this period he attended the school of William Hawley, an accomplished arithmetician; and afterwards, having resolved to try his fortunes in America as a machinist and inventor, he went to Edinburgh and entered upon a course of studies, embracing mathematics, engineering and drawing. Arriving in this country in 1819, he devoted himself to the improvement of agricultural implements. His first effort was in making an improved plow, which took the first premium at three county fairs. In 1820 he invented the first cultivator in the country. In 1825 he received a patent for his machine for making the wrought spike and in 1835 for a machine for making horse-shoes. 1840 he patented a machine for making the hook-headed spike, an article which is used on every railroad in the United States. In the same year he patented a self-acting machine for reducing iron into blooms after puddling. In 1843 he patented an improvement in his horse-shoe machinery. In 1849, he patented a self-acting machine for rolling iron into bars. In June, 1857, he patented a new machine for making horse-shoes. This may be considered his greatest triumph in mechanics; it is self-acting and produces from the iron bars sixty shoes per minute. He has obtained patents for this machine from every prominent government in Europe.

THOMAS PAINE.

In the Surrogate's office of the city of New York there are some curious old documents stowed away, among which is the last will and testament of Thomas Paine. This was recorded 10th of June, 1809. More than half a century has elapsed since the spirit of that bold explorer of the realms of metaphysics passed the mystic domain where he must meet the proofs or refutation of his philosophy. The impression has generally prevailed that Thomas Paine was an Atheist. But his last will and testament is conclusive evidence that such was not the case. A few extracts will establish the fact that he was an earnest believer in the existence of an Omnipotent Being, his Creator and his God. Thus says the will:

"Reposing confidence in my Creator,

God, and in no other Being, for I know of no other, nor believe in any other, I, Thomas Paine, of the city of New York, author of the work entitled 'Common Sense,' written in Philadelphia, in January, 1776, which awakened America to a Declaration of Independence on the 4th of July following, which was, as fast as the work spread through such an extensive country, 'The American Crisis on Peace,' 'Rights of Man,' 'Age of Reason,' etc., etc. He bequeaths a legacy to 'Margaret Bonnerville, in trust of her children, to bring them well up, give them good and useful learning, and instruct them in their duty to God, and the practice of morality.'"

As this will was recorded on the 10th of June, 1809, five months after the date of its execution, it may be considered as the testator's death-bed confession of religious faith. That he was not an Atheist, or, at least, that at the eleventh hour, he recognized the Supreme Being, is evident; but his peculiar expressions in regard to his religious faith, and the absence of any allusion to the Savior, suggested that he rejected the doctrines of Christianity, and was what is termed a Deist.

JAMES BOGARDUS.

This prolific inventor was born in Catskill, New York, March 14, 1800. He was a descendant of Dominee Bogardus, one of the early settlers, and engaged in farming. At the age of fourteen, James was apprenticed to a watch maker, and subsequently became a skillful workman. By close application he became a good die sinker and engraver. Desiring to see something of the world, in 1820 he went to Savannah, Ga., and there worked at engraving. He afterward returned to New York, engaged in watchmaking, and invented a three-wheeled chronometer clock, for which he received the highest premium at the first Fair held by the American Institute. In 1828 he invented the ring flyer for cotton spinning, now in general use. In 1829 he invented the eccentric mills, which differ from all other mills; the grinding-stones or plates running the same way with nearly equal speed, but eccentric to each other. He also invented a machine for transferring bank note plates for Messrs. Rawdon, Wright & Co., which invention is in universal use for that purpose. In September, 1836, he visited England, and, in competition with English and French engravers, made a machine that excelled all others in engraving the head of Ariadne in relief, and which would also, from the same medal, twist the face in a variety of comic shapes. This same machine engraved a portrait of the Queen, Sir Robert Peel, and others. While in England he contracted with a company in London to build a machine for transferring bank note plates and other work, and also a machine for engine-turning, which machine was to copy engine-engraving. A reward being offered in England for the best plan of carrying out the penny post system, Mr. Bogardus' plan was adopted over 2,600 applicants, and is now universally used. Returning to New York in 1840, he invented machines for pressing glass tumblers, etc., now in common use, and also a machine for cutting india-rubber into fine threads. In 1847 he put into execution his long cherished ideas of iron buildings; constructing a large factory in New York city entirely of iron, five stories high, ninety feet long, and the first cast-iron

building in the world. Since then, iron buildings have been erected in nearly all the principal cities of the United States and elsewhere. This invention formed a new branch of business for mechanics, benefited nearly every foundery in the country, and gave an immense impetus to the manufacture of iron.

THE BROTHERHOODS.

Freemasonry.

The society of Ancient Free and Accepted Masons, is, probably, the most ancient social institution in the world. It is impossible to write its history, for its origin is shrouded in obscurity, and clouded with conflicting tradition. A constant research, and enthusiastic and faithful study on the part of its votaries, has dispelled many of the untenable legends connected with the institution, without in the least impairing its general history, its philosophy, or its sublime teachings. Intelligent Masons no longer indulge in such nonsense as "Noachite Masonry," dating the origin of the order anterior to the flood, or that other insanity of sentimentalism which makes Masonry coeval with creation, simply because it is simple truth. The fact that it is merely a human social organization, founded upon the absolute commands of God to man, showing us our duty to each other, through our responsibility to Him, is fast becoming (as it ought,) the fourth great light in Masonry, and destroys all that fabulous history which makes a great social organization in the days of Adam and Noah, when there was but one family on the whole face of the earth. The intelligent Free Mason of to-day, very properly repudiates all this superstitious faith, while he fully appreciates the absolute truth of the tenets of his order, and the extraordinary beauty and exactness of the allegories in which they are taught.

It is impossible for any person to even guess when or where this magnificent system of morality and brotherly love had its commencement. That it is of very ancient origin is proven by the fact that it is found among all the nations of the earth, teaching, by different rites, the one great lesson of the dignity of man, and the holiness of brotherly love. Its legislative and subordinate government, its laws, its discipline, and its means of recognition are the same all over the world. There is no buncombe in the statement that it has a universal language, which addresses the ear, the eye and the hand, and which is known among the faithful throughout the globe.

It is safe to presume that Free Masonry had its origin long before the Christian era, when all trades were wrought in secret. At an early day it came in contact with the theological doctrines of the Egyptians, the Greeks and the Tyrians, and a system of moral philosophy was grafted on the operative part of the institution, which operative part in the course of time, was lost to sight in the brighter rays of the faith, the hope and the charity which its purely moral lessons taught. There is nothing to disprove that the blending of the moral or "speculative" Masonry with the operative part, or stone-masonry, was the result of the great executive ability of King Solomon, although some of the more radical of the modern Masons deny it. Be that as it may, the Free Masonry of the present day is entirely speculative; or, as Lafayette so beautifully expressed it, "a system of morality veiled in allegory and illustrated by symbols." Its

great object is to teach, through the teachings of God, the one Great Father of Mankind, the dignity of our humanity, and our personal duties toward our fellow-men. Its sublime lessons are taught in different countries by different rites and ceremonies, just as the divergent branches of a tree bear the same fruit from a common stem. The first three degrees, (or what is called "Symbolic Masonry,") are the same all the world over: and any Master Mason can visit any Lodge, even though he may not understand a word of the language in which the business of that Lodge is conducted. This is the parent trunk; and from it the allegorical branches shoot far and wide. The most universally disseminated of the higher degrees, are those known as the "Ancient and Accepted" or "Scottish" Rite. It is well known in America; and is the only rite known in Asia, Continental Europe and South America. It consists of thirty-three degrees, the last of which is rarely attained. The "York" or "American" Rite, is the one best known in the United States. It also has numerous bodies in Great Britain and Canada. It consists of thirteen degrees, of which the Royal Arch is the seventh, and the Knight Templar the twelfth. It is really an off-shoot of the Scotch Rite, and is courteously recognized by all "high Masons" throughout the world, although practiced only in countries speaking the English language. The "Swedish" Rite consists of twelve degrees, the fifth of which, "Master of St. Andrew," makes its possessor a nobleman in the civil law of Sweden. The King of Sweden is always a Mason, and is the hereditary Grand Master of the Kingdom.

Masonry has always gathered round its altars the greatest and best of men. Americans can point with pride to Washington, Franklin, Lafayette, Henry Clay, Grand Master of Kentucky; Andrew Jackson, Grand Master of Tennessee; De Witt Clinton, Grand Master of New York; Bishop Griswold, of Connecticut; Bishop Chase, of Illinois, and many other clergy, statesmen and philosophers.

At the present time the Prince of Wales (33d) is the Grand Master of England. The Emperor William (33d) is Grand Master of Germany. His son, the Crown Prince (32d) is Deputy Grand Master. Garibaldi is (or was) Grand Master of Italy.

Odd Fellowship.

The eternal and beautiful principles of brotherly love, relief and truth, have given rise to the formation of many societies, having for their object the love and care of the great human family. Men can have no nobler object in life; and no society of men has more nobly fulfilled this pleasant duty than the Independent Order of Odd Fellows.

This order first saw the light in the city of Baltimore. Its birthday was the twenty-sixth day of April, 1819. Its founders were Thomas Wildey, John Welsh, John Duncan, John Cheathem and Richard Rushworth. They declared their object to be "the aid and protection of brothers when in sickness and on travel, and for the purpose of benevolence and charity;" and the motto they adopted was, "We command you to visit the sick, relieve the distressed, bury the dead, and educate the orphan." The only creed it requires of its candidates, is a belief in the one living and true God. All men of good moral character, of whatever party, sect or creed, are alike open to its responsibility and entitled to its benefits.

In its social life, Odd Fellowship has done a vast deal of good. Its tendency to promote friendship and good feeling among its members is one of the most beautiful features. In this age of selfishness, when individual aggrandizement is the chief motive of human actions, and men in their daily struggles for wealth or power are continually coming into violent collision with each other, it is pleasing to reflect that an institution has been established by which confidence among men is created, and an opportunity given for the free exercise of all the finer and nobler feelings and impulses of our nature. Nothing is so fatal to friendship as distrust; and when men are taught to act towards their most intimate friends as if they might some day become enemies, they soon learn to check all those exhibitions of feeling and sympathy which might expose them to the schemes of the cunning and designing, or subject them to the ridicule of the worldly and heartless. But among Odd Fellows, where man meets man as brother and equal, does he feel safe in opening the inmost recesses of his heart, and laying bare his cares, his woes, and his sorrows, and give full scope to all the warm affections and noble impulses of his nature, or seek the consolation and sympathy of his fellows without fear of exposure or ridicule.

But, viewed merely in the light of an association for the purpose of affording pecuniary assistance to its members in case of need, Odd-Fellowship presents many features worthy of our highest admiration. By means of association — that great principle of modern civilization, by which cities have been built, rivers turned from their channels, and even "old ocean's gray and melancholy waste" made subservient to the wants of man, Odd-Fellowship proposes to effect that which individual charity could never accomplish.

Under the best of governments, and in the most prosperous times, we are liable to misfortunes, which no human foresight can guard against, and no human prudence prevent. Independently of the natural causes which may, in the twinkling of an eye, blight our fairest hopes, and lay prostrate in the dust the hard earnings of many a weary hour of toil and labor, there are other causes continually at work to sap the foundations of human happiness and prosperity. Envy, hatred, and rivalry are still to be found in the world; and, in the fierce struggle for wealth and honors, no man knows how soon he may be supplanted by a wily adversary, or foiled by a malignant foe. The race is not to the swift, nor the battle to the strong; and success in worldly matters depends so often upon accidental circumstances, that the great race of human life may be well compared to the game of chance, where although much depends upon the skill of the player, still more depends upon the wild caprice of fortune.

To guard its members against these strange vicissitudes, is one of the objects of Odd-Fellowship; and thus it may not improperly be called a mutual insurance association, where, in consideration of a trifling weekly contribution, the worthy brother has guaranteed to him a regular allowance during sickness, and assistance in case of actual necessity and want. Thus the Odd-Fellow is not thrown upon the cold charity of a heartless world, but applies for assistance to that fund which he contributed to raise, and upon which he has a *right* to rely for aid. He feels none of that galling

sense of dependence which the reception of charity from strangers produce, but fearlessly throws himself upon those resources to which he has a legal and equitable right, with the full confidence that they will not be denied him or grudgingly bestowed.

The present status of the order must be eminently satisfactory to the membership. According to the last report (September, 1888), of Theo. A. Ross, Grand Secretary of the Soveregn Grand Lodge, it has two independent Grand Lodges), German Empire and Australasa), 48 Subordinate Grand Encampments; 2,077 Subordinate Encampments; 65 Subordinate Grand Lodges; 8,570 Subordinate Lodges; 104,405 encampment members; 574,-161 lodge members; 1,498 degree lodges of the Daughters of Rebekah; 39,-176 members of Rebekah lodges; 40,389 sisters, members of Rebekah Lodges; 500 Cantons of Patriarchs Militant (estimated), and 20,000 Chevaliers, rank and file (estimated). Statistics of the order from 1830 to December 31, 1887: Initiations in subordinate lodges, 1,517,420; members relieved, 1,328,189; widowed families relieved, 169,766, members deceased 130,265; Total relief, $46,020,890.79; total receipts, $121,235,779.18. The increase in lodge membership during 1887 was 25,422—the largest gain in any one year since 1873. The relief paid in 1887 was $2,253,776.02; receipts, $6,065,091.42.

Knights of Pythias.

This younger brother in the family of secret and benevolent societies was organized in Washington, D. C., in the year 1864. Its originator was Mr. J. H. Rathbone. Its main purpose, as its historian, Mr. Joseph D. Weeks says, is "the inculcation of lessons of friendship, based upon the old story of Damon and Pythias." The oldest lodge of the order is Washington Lodge No. 1. The first officers were J. H. Rathbone, Chancelor, J. R. Woodruff, Vice Chancelor, J. T. K. Plant, Patriarch, D. L. Burnet, Scribe, A. Van Der Veer, Banker, R. A. Champion, Assistant Banker, G. R. Conert, Assistant Scribe. In less than three months from its organization another lodge was established at Washington Navy Yard. Two more lodges were formed the same year. For about a year the order languished; but it soon revived, and commenced pitching its tents in Pennsylvania. It grew rapidly in that State, laying there the foundation of its present prosperity and usefulness. From there it went into Maryland, New Jersey and Delaware. On the fifteenth of May, 1868, a convention of the different grand lodges met in Philadelphia, and organized the Grand Lodge of the world. The order soon afterwards spread into New York, Virginia, Connecticut, Louisiana, Nebraska, California, West Virginia, Ohio, Illinois, Kentucky, Massachusetts, Indiana, Iowa, South Carolina, Georgia, Wyoming, New Hampshire, Missouri, Vermont, Minnesota, Alabama, New Brunswick, North Carolina, Colorado, Arkansas, Utah, Oregon, Washington Territory, Wyoming Territory, Hawaiian Islands, and Dacotah Territory in the order named. In all of these States the order flourishing more and more every year, having now hundreds of lodges, and thousands of faithful members. Its last report shows 1471 Subordinate Lodges, and a total membership of 101,513.

There was a time, however, in the early history of the order, that was dark and disheartening. "It was forced to endure the struggle with poverty.

Nothing discouraged, the members worked on; and though no one stood near to prophecy of success, their own consciousness was itself prophetic, through the Fall and Winter of 1864. Early in February a gleam of hope appeared, by its extension into Virginia. This was the first time that the order had gone beyond the city of its birth; and for a moment it roused the hope of every Knight. But the coming of Spring, the uncertainty about everything of a business nature, the high price of gold, and the constant changes taking place at the national capital, all worked against the order. The finances of the Lodges were in a desperate condition, with no revenue, and little prospect of any. In April, two lodges in Washington ceased to hold meetings; and the other could hardly command a quorum. In July, the lodge at Alexandria died, aged three months. In June, 1865, the Grand Lodge held a meeting with only one Lodge represented. A month after, Franklin Lodge was the only one in existence. It was a dark hour, but the one little band of true Knights toiled and waited. In May, 1866, the Grand Lodge was re-organized, and from that time to this, the order has grown and prospered constantly.

HOW NOTES AND FRACTIONAL CURRENCY ARE MADE.

In the manufacture of bank notes and fractional currency by our government, the utmost care is taken to prevent any errors, and a perfect system is required and followed in each and every department. First the ink for printing is made in a large room in the building, where ten or a dozen paint mills are busily grinding the colors and oil together. Two large ones are filled with green ink, suggestive of liquid greenbacks, another, with vermillion, while others are making blue, red, and other tinted inks. Nothing but the finest color and the best boiled linseed oil is here used. The paper is received directly from the Government, cut in sheets of the required form. The fractional currency and larger notes are made of a peculiar material containing colored fibers, manufactured at Glen Mills, near Philadelphia. The paper for postage stamps is made by the Bank Note Company, of the best linen. It is of short fiber, very fine, and extremely strong. The sheets on which currency is to be printed are counted as soon as received, and the result telegraphed to Washington for verification. Some idea of the accuracy required may be gathered from the fact that, for every sheet unaccounted for, the company has to pay in cash the full value of what *might* have been printed on it; that is to say, if a sheet intended for four $1,000 notes is missing, $4,000 must be returned. The paper varies in size according to the purpose for which it is designed. Thus the sheet for 10 cent fractional currency is $7\frac{1}{2}$ by $16\frac{3}{4}$ inches, and so on up for the larger denominations. All the paper is not received perfectly blank, for the reason that the National Company prints but one side of each bill. The material for the 15 cent and 25 cent notes is supplied with the backs already finished—the work being done by the American Bank note Company; while, *vice versa*, the 10 cent bills are sent to the last mentioned corporation from the National Company in a similar condition. The sheets being counted are placed in heaps, marked off in sets of 100 and 1,000. When issued for printing, the workman re-

ceiving them has to present an order signed by the Superintendent. They are then charged against him in his pass book, when he carries them away to be damped, this being done by simply wrapping them in wet cloths.

In a large apartment, in the center of which are 116 presses arranged closely together. These are simply cylinders moved by long handled levers, and are each attended by three men and a girl. Here is a plate resting upon a small iron box warmed underneath by gas flames. A workman rapidly covers it with ink with a plate printer's roller and passes it to another operative at his side, who wipes the plate over with a soft cotton cloth, and then polishes with the palm of his hand covered with whiting, thus removing the ink from its surface but not from the engraved lines, which remain filled. This done, the plate is placed, face up, in the press. The girl stands ready with a sheet of damped paper which she carefully lays upon the plate. The pressman turns the levers, the cylinder revolves, the plate passes under it, and the paper is removed bearing a perfect impression. It might be naturally imagined that the workmen engaged in this portion of the manufacture would often succumb to the temptation of furtively running a sheet of ordinary paper through the press, and thus possessing themselves of, say, 200 ninety cent stamps in a moment's time. But such a proceeding is practically impossible. Apart from the constant vigilance of the superintendents, the presses are placed so close together that the men can overlook each other's every action. One of the strongest safeguards is the *esprit de corps* among the workmen themselves. So sensitive are they that they recently insisted upon the discharge of one of their number who, merely to try his press, ran a sheet of common brown paper through it.

As soon as a printer has completed the work assigned to him, he hands it, made up in "books" of 100 impressions, each sheet inclosed between two others of brown paper, to a clerk. He is then credited with his delivery, spoiled sheets being counted the same as perfect ones, so that if his return is correct, his debit account on his pass book, which is kept in a totally different apartment and by other employees, is thus balanced. The finished impressions are now carefully counted and inspected. The spoiled ones are removed and sent to Government agents to be burnt, while the others are hung in the drying room. This apartment is heated by steam pipes, and the paper is suspended by wires, for a day or two, until perfectly dry. Then the brown paper is removed and the sheets, packed between leaves of press board, are subjected to the action of a powerful hydraulic press. They are then once more inspected and counted.

INVENTION OF THE LEYDEN JAR.

Certain parts of works on physical science, written a century or more ago, are at the present day sometimes very interesting to read on account of the expressions of delight indulged in by the authors, on matters which, at present, are considered of a trifling interest compared with what is now known in regard to the sciences of nature. Priestly, in his "History of Electricity," published in London, 1767, says: "The end of the year 1745, and the beginning of 1746, is celebrated by reason of the most astonishing discoveries which have ever been made in

the whole field of electrical science, namely, the wonderful condensation of this force in a glass named the Leyden jar, because it was first made by Cuneus, of Leyden, while experimenting with Professor van Muschenbroek," etc. How the author would be amazed if he could return, after a sleep of only one century, and be initiated in the since discovered mysteries of galvanism, voltaic batteries, electro-plating, electro-magnetism, dynamic electricity, the electric light, magneto-electricity, the laws of Ohm, the electric telegraph, the modern electric machine, the condenser (which is, for voltaic electricity, what the Leyden jar is for frictional electricity,) the Ruhmkorff coil, the Geissler tube, the application of the spectroscope to substances illuminated by electric light, the effect of electro-magnetism on polarized light, and then finally witness the modern experiments which promise discoveries that, during the next century, will even put all these in the shade!

The history of the discovery of that form of electric induction on which the invention of the Leyden jar is founded, is thus given by Desaguillers: "Professor van Muschenbroek, of Leyden, Holland, and some of his friends, observing that electrified bodies, exposed to the air, lost their electricity rapidly, imagined that, if they inclosed a conducting body in a non-conductor, it would become possible to charge more electricity into the conductor and retain it longer. As a glass bottle was the most convenient non-conductor, and water the most common conductor, water was placed in a bottle, a brass rod put in the water, and the same charged by the intervention of this rod; but nothing particular was observed till Mr. Cuneus, who supported the glass flask by his left hand while it was being charged, supposing that the water had received as much electricity as it could contain, attempted to withdraw the brass wire with his right hand, when he was suddenly frightened by a violent shock in his arms and chest." The water served here for the inner coating of the jar, and his left hand for the outer coating; and yet, however simple and easily repeated the experiment is, there were at that time many experimenters who, after reading the published accounts and trying it for themselves, did not succeed, being still in the dark about the conditions required for success, which at the present day are so well known.

It has been proved that the discovery of the same principle and its application by Von Kleist, in Germany, in the same year, was without knowledge of the above, each investigator working independently of the other. Those who succeeded gave the most exaggerated account of their feelings. Professor Van Muschenbroek, who made the experiment with a flask of very thin glass, and therefore obtained a most powerful charge, declared, in a published letter that he was so violently struck in his arms, shoulders, and chest that he lost his breath, and two days elapsed before he was recovered from his fright. He adds that he would not submit to a second shock for the whole kingdom of France.

M. Allamand made the experiment with a common glass tumbler, and says also that the shock took his breath away, that he felt such a violent pain in his arms as to fear serious consequences, but that it passed over without injury to him. Winckler, of Leipsic, tells another story. He says that

when he first performed the Leyden experiment upon himself, he felt strong convulsions over his whole body; his blood was brought into a most violent agitation, and a burning fever would have been the result if he had not taken cooling medicines. He felt also a heaviness in his head, as if a large stone laid upon it; it caused him twice to bleed at the nose, which otherwise seldom took place. His wife appears to have been of an investigating turn of mind, and much less afraid than he; she took the shock twice, but Winckler says that she was then so weakened that she could not walk, and a week later, having obtained the necessary courage to permit him to give her another shock, she commenced at once to bleed from the nose.

But everybody was not so foolishly frightened. M. Bose, with a truly philosophical courage worthy of Empedocles wished to be killed by the electric shock, in order that the account of his scientific death might procure an article for the Memoirs of the French Academy of Sciences, but his wish was not fulfilled.

The electric shock produced by the Leyden jar attracted then so much general interest that many persons traveled around Europe and made a living by administering it, some of them pretending to cure by it all kinds of diseases.

Foremost of those who advanced this branch of science must be mentioned Gralath, in Germany, who, in 1746, gave the shock at great distances and through twenty persons at once, and invented the electric battery, consisting of a number of Leyden jars. Finally, Drs. Watson and Bevis, according to the *Philosophical Transactions*, found the modern method of covering the outside of the jars with tinfoil, while the first connected several separate masses of combustible fluid with metalic wires, and ignited them all with the same spark. After accounting for many other experiments, he says, in a prophetic style: "Notwithstanding the many great discoveries made during the latter years in this branch of natural sciences, posterity will consider our knowledge to be in its infancy; therefore we must, in so far as experiments justify us, be ready to modify or abandon our conclusions as soon as other more probable theories are proposed."

Another investigator, quoting these words fifty years later, says: "Considering the rapid progress since that time, we may hope that even the so enormously advanced science of the present day (1795) will, at some future time, be looked upon as merely in its infancy."

These prophecies have been fulfilled, and who dares to assert that the climax of knowledge has now been reached? Have not the number of discoveries and their importance been progressing, since that time, in an increasing ratio? Have not our scientists become more and more expert in the art of making discoveries and inventions? What then will posterity witness only thirty years hence, in the beginning of the twentieth century? Who can prophecy the mysteries of the future, in regard to science, which is always surpassing anything man can conceive *a priori?* Who can name a subject more interesting, more useful, more fascinating, to the lover of truth, progress, and beauty?—*Scientific American.*

HORSE-SHOES made of iron were first used in A. D. 481. Stirrups were not made till a century later.

A BARREL OF FLOUR.

"Why were 196 pounds of flour, instead of 200, called a barrel?" The flour barrel is an American institution, and was adopted before the Revolution. The millers desired to make its contents as nearly 200 pounds net as conformity to the weights then in use would allow; thus the ton of 2,240 pounds was divided into 20 hundred weight (cwt) of 112 pounds each, the hundred weight into four quarters of 28 pounds each, and the quarter into 2 stone of 14 pounds each. The nearest to 200 pounds was 14 stone, or 196 pounds, and the practice of putting that weight into a barrel of flour has never been changed. The stone (14 pounds) is in very general, almost universal, use in England to this day, especially in respect to agricultural products.

THE ORIGIN OF PETROLEUM.

The recent development of the reproductive power, of petroleum wells that had been for some years abandoned because they were believed to be exhausted (says the *Petroleum Monthly*), is not alone a matter of value, to the owners of the territory that was until lately presumed to be incapable of further production, but it affords a more trustworthy basis than any the world has hitherto been able to obtain for forming an approximately correct opinion concerning the chemical process whereby petroleum is generated. Until within a few days, a popular opinion prevailed that petroleum, in spite of its name, was the product of coal; and so nearly was this idea general among a majority of people, that many foreign receivers of petroleum are still accustomed to order it as "coal oil." The belief, however, that the terrene oil of Pennsylvania and Canada is exclusively a product of bituminous coal may now safely be pronounced to be an error. There is certainly no evidence that coal is not one of the substances from which petroleum is distilled; but, at the same time, it is a somewhat strange fact, allowing a proper degree of credit to the belief that coal does enter into the composition of petroleum, that no coal beds susceptible of being worked are known to exist within fifty miles of oil-producing territory. Again, it is a manifest and recognized fact that carbon does predominate as an integral essence of petroleum; and the other fact that the oil territory of Pennsylvania is surrounded by beds of bituminous coal, renders it eminently reasonable to believe that coal enters largely—if not, indeed, more largely than any other substance—into the process of distillation whereby petroleum is produced. Petroleum is certainly a mineral oil. But whatever may be the number and chemical variety of the minerals from which it is formed, the distillation of it is more intimately associated with limestone than with any other mineral. Sandstone is also found in boring oil wells, but it is from the pores of limestone that, in the chemical process of extracting oil from the minerals found in connection with its production, the greatest quantity of petroleum is taken. It is singular that, in boring for oil, no coal has ever been found, even in the smallest quantities, while sand, sandstone, and limestone abound. The inference, therefore, cannot be escaped that petroleum is the product of the distillation of at least two, and probably of more than three distinct mineral properties.

GLUE.

Glue was made and in common use by the ancient cabinet-makers of Egypt. Various sticky matters were used by the Greeks, such as glue, betel-lime and cobblers wax. In Lucretius' Book VI you will find where it speaks of wood being joined together with glue, prepared from certain parts of oxen and with such strength that the veins of boards will open in a crack sooner than the seams of oxglue will relax their fastenings. Glue is made of the clippings of hides, horns and hoofs; washed in lime-water, boiled, skimmed, strained, evaporated, cooled in molds, cut into slices and dried upon nets. The substances most largely and generally employed are the parings of hides and skins from the tanneries and slaughter houses, known as glue pieces, fleshings, pelts from furriers, the hoofs and ears of horses, calves and sheep. The parings of ox and other thick hides make the strongest and afford about forty-five per cent of glue.

The clippings and refuse materials are first placed in a lime pit, and when sufficiently steeped they are immersed in water, well washed, rinsed, and placed on hurdles to dry. Afterwards they are boiled to the consistency of thick jelly, which is passed, while hot, through osier baskets, or bags and nets made of rope, to separate the grosser particles of dirt or bones from it, and allowed to stand some time to purify further. When the remaining impurities have settled to the bottom it is melted and boiled a second time, and when thick enough it is drawn off into a vessel and maintained at a temperature which will keep it liquid. This gives further time for the deposition of solid impurities, and for clarification, by the addition of such chemicals as the manufacturer may prefer.

The glue is then run off into wooden coolers, about six feet long, one foot broad and two feet deep. Here it becomes a firm jelly, which is cut out by a spade into square cakes, each cake being deposited in a sort of wooden box, open in several slits or divisions to the back. The glue is cut into slices by passing a brass wire, attached to a kind of bow, along the slits. These slices are placed upon nets, the marks of which are seen on the dry glue, and stretched in wooden frames, removed to the open air, placed in piles, with proper intervals for the admission of air, each pile being roofed in, as a protection from the weather. When the glue is about three quarters dry it is removed into lofts, where in the course of some weeks the hardening is complete. They are after drying dipped into hot water and slightly rubbed with a brush wetted with boiling water to give them a gloss, and store-dried. This furnishes the palest and best glue. Any scraps of gelatinous matter left in the boiler, is treated with fresh water but produces an article of inferior quality.

THE INFLUENCE OF NEWSPAPERS.

A school teacher, who has been engaged a long time in his profession, and witnessed the influence of a newsapper upon the minds of a family and children, writes as follows: I have found it to be a universal fact, without exception, that those scholars of both sexes, and of all ages, who have access to newspapers at home, when compared with those who have not, are:

1. Better readers, excellent in pronunciation, and consequently read more understandingly.

2. They are better spellers, and define words with ease and accuracy.

3. They obtain practical knowledge of geography in almost half the time it requires of others, as the newspapers have made them acquainted with the location of the important places of nations, their government and doings on the globe.

4. They are better grammarians for having become so familiar with every variety of styles in the newspapers, from the common place advertisement to the finished and classical oration of the statesman, they more readily comprehend the meaning of the text, and constantly analyze its construction with accuracy.

5. They write better compositions, using better language, containing more thoughts, more clearly and more correctly expressed.

6. These young men who have for years been readers of newspapers are always taking the lead in debating societies, exhibiting a more extensive knowledge upon a greater variety of subjects, and expressing their views with greater fluency, clearness and correctness.

"THE OLD OAKEN BUCKET."

The popular song of "The Old Oaken Bucket" is said to have its origin under the following circumstances, which give it additional interest: Some years ago, when Woodworth, the printer, and several others, "Old New Yorkers," were brother typos in a printing office which was situated at the corner of Chestnut and Chambers streets, there were few places in the city of New York where one could enjoy the luxury of a really "good drink." Among the few places most worthy of patronage was an establishment kept by Mallory in Franklin street, or about the same spot where St. John's Hall recently stood. Woodworth, in company with several particular friends, had dropped in at this place one afternoon for the purpose of taking some "brandy and water," which Mallory was famous for keeping. The liquor was super-excellent, and Woodworth seemed inspired by it, for after taking a draught he laid his glass upon the table, and smacking his lips declared that Mallory's *eau de vie* was superior to any he had ever tasted. "No," said Mallory, "you are quite mistaken; there was one thing which in both our estimations far surpassed this in the way of drinking." "What was that?" asked Woodworth, dubiously. "The draught of pure fresh spring water we used to drink from the old oaken bucket that hung in the well after our return from the labors of the field on a sultry day in summer." The teardrops glistened for a moment in Woodworth's eyes. "True! true!" he replied, and soon quitted the place. He returned to the office, grasped the pen, and in half an hour "The Old Oaken Bucket," one of the most delightful compositions in our language, was ready in manuscript to be embalmed in the memory of succeeding generations.

THE OLD WORLD.

The recent expeditions for the geological survey of the Western States have furnished results which tend to show that America has a better claim to the title of "Old World" than Europe or Asia. Among the discoveries that have been made is the former existence of a series of great lakes between the Mississippi River and the Rocky Mountains. Surrounding these there were a flora and a fuma of a tropical character; and in the lower strata which at

intervals come to the surface, many gigantic fossils are found, not only of great, extinct pachyderms or thick-skinned animals, but also fossil turtles, mastodons, tigers, hyenas, wolves and camels. The question has been often learnedly and thoroughly discussed, and geologists who rank high among scientists are now disposed to regard the American continent as the earliest dry land that appeared.

ARABIAN MODE OF PERFUMING.

How the Arab ladies perfume themselves is thus described by Sir Samuel Baker in his work on the Nile: "In the floor of a hut or tent, as it may chance to be, a small hole is excavated sufficiently large to contain a champagne bottle. A fire of charcoal or simply glowing embers is made within the hole, into which the woman about to be scented throws a handful of drugs. She then takes off the clothes, or robe which forms her dress, and crouches over the fumes, while she arranges her robe to fall as a mantle from her neck to the ground like a tent. She now begins to perspire freely in the hot air bath, and the pores of the skin being open and moist, the volatile oil from the smoke of the burning perfumes is immediately absorbed. By the time the fire has expired, the scenting process is completed, and both her person and her robe are redolent with incense, with which they are so thoroughly impregnated that I have frequently smelt a party of women strongly at full a hundred yards distance, when the wind has been blowing from their direction. The scent, which is supposed to be very attractive to gentlemen, is composed of ginger, cloves, cinnamon, frankincense, and myrrh, a species of seaweed brought from the Red Sea, and lastly the horny disc which covers the aperture when the shell fish withdraws itself within its shell. The proportions of these ingredients in this mixture are according to taste."

THE USES OF OLD RAGS.

Woolen rags as they come in from the peddlers, comprise every variety of fabric that it is possible to produce from wool, from a coarse and harsh carpet to the finest and softest product of the loom. These are piled up in huge heaps upon the warehouse floor, and women and girls, whose wages average from four to five dollars a week, attack them on all sides and "sort" them into no less than ten grades, each of which has a special use and an established value. The greater part of these are manufactured into "shoddy," and, as this is a word concerning which a general misapprehension exists, it may be well to devote a paragraph to its consideration.

Shoddy is, perhaps, the best abused material in use. So far from being a mere sham and a poor substitute for wool, it is, in reality, a valuable material, and enters, in certain proportions, into the composition of nearly all cloth. It is not, as is generally supposed, woolen rags ground to a powder and worked into the cloth to give it weight, but wool fiber, combed out of wool fabrics by a peculiar process, and mixed with new wool when the latter is carded, is spun with it, and finally becomes a component part of the cloth.

Thus, by mixing a due proportion of fine grade of shoddy or wool fibre with new wool of a coarse grade, a substantial yet soft and handsome fabric can

be produced and sold at a moderate price; while the same thing, with fine high cost wool in the place of the much reviled shoddy, would cost far more and possess but little more value so far as wear and appearance are concerned.

Cotton and linen rags are sorted with equal care. They are the principal source of paper making material, and are in constant demand. Used alone, they make the highest grade of paper, while, in combination with varying proportions of paper stock, they produce the various grades of paper to be found in the market. Paper material may be used over and over again, provided always that a given amount of new rag stock is used, but it deteriorates in value with each process, owing to the breaking and consequent shortening of the fiber; and, beginning, say in a form of writing paper of fine quality, it passes successively through the various grades, and eventually is found in the shape of a coarse article, possessing little strength and small value.

SCALES.

Weighing-machines and scales of some kinds were in use 1800 years B. C., as it is said, that Abraham at that time weighed out 400 shekels of silver current money with the merchant to Ephron the Hittite, as payment for a piece of land including the cave and all the standing timber in the field and in the fence. This is said to be the earliest transfer of land of which record survives, and that the sale was made in the presence of witnesses. The superintendence of weights and measures in ancient Egypt belonged to the priests, until the privilege was removed from them by the Romans. The original form of weighing scales was probably a bar suspended from the middle, and a board or shell suspended from each end, one to contain the weight and the other the matter to be weighed. The *steelyard* was probably so-called from its material and former length in England, and is also known as the Roman Balance. It was used in Rome under the name of *staterd*. It is said to be a Chinese invention. The *lever scale* has been in use in the United States for the last forty years. Platform scales were patented in England in 1796. The platform scales, as well as all other kind, manufactured in this country, are about as near perfection as skill and the best of workmanship can make them.

SILVER PLATING.

The earliest method used for giving a sheet of metal a coating of silver is the only one, perhaps, to which the term silver plating can be strictly applied. In this process a sheet of copper was thoroughly cleaned and then treated with a strong solution of nitrate of silver, and next covered with a sheet of silver. After the metals had been heated red hot, they were rolled out together. The silver could be applied to either or both surfaces of the copper. After the sheets were formed in this way, they were beaten or stamped into various shapes. Vessels, such as coffee urns and teapots, were made by beating out the parts separately, and then soldering them together.

Analogous to this is the so-called close plating that is used to a considerable extent for harness mountings. In this process, the article to be plated, which is generally made of iron, is first filed smooth, and is then coated with

metallic tin, by dipping it first into acid, and then into molten tin. The silver is rolled into very thin sheets, then applied to the article, and burnished down with hot tools. These tools are heated hot enough to melt the tin, which therefore serves as a solder between the silver and iron.

Fire silvering is effected by covering the article with a silver amalgam, or a mixture of spongy silver, salammoniac, common salt, and corrosive sublimate. The articles are then exposed to the heat of a muffle.

Various processes have been proposed for giving a coating of silver in the wet way. These mostly depend upon the mixture of some salt of silver, such as the chloride of cyanide, with a reducing salt, such as cream of tartar, sulphite of soda, or cyanide of potassium. A good mixture for this purpose is one hundred parts of sulphite of soda, with fifteen parts of chloride of silver. This should be made into a thick paste, and it is well to add a little prepared chalk, or rotten stone. The article to be coated is cleaned by any good polishing powder, and then rubbed with the preparation. The coating of silver is very thin, and soon wears off.

All these methods have of late years been almost entirely superseded by the process of electro-plating. The articles to be electro-plated are made from any metal that is cheap and can be easily worked. Britannia, which is an alloy of copper, antimony, and tin, or German silver, which is made from nickel, zinc, and copper, being perhaps the most commonly employed. These metals have the advantage that they are very nearly the same color as silver itself, and therefore when the silver is worn through, they do not show it so quickly as a dark metal would.

The metals are first cast into bars, and then worked into shape by rolling, stamping, or hammering. If an article consists of several pieces, these are soldered together; and if it is to be engraved it is engraved and entirely finished before being covered with silver. The article is cleaned by dipping it first into a solution of caustic soda or potash, then into an acid bath, and finally into a strong solution of cyanide of potassium, taking care to wash it thoroughly in pure water between the dippings. The articles are handled by means of the wires by which they are to be suspended in the bath, and on no account must they be touched with the fingers, for every such touch will produce a spot in the finished work. Having been thus thoroughly cleansed, it is connected with a strong battery, and hung in a solution of cyanide of silver and potassium. It remains in this only a few moments, until it is covered with a thin film of silver, when it is ready for the regular plating operation.

The plating solution is made in two different ways. In the first, a solution of nitrate of silver is precipitated with either common salt or hydrochloric acid. The chloride is well washed, and then dissolved in a solution of cyanide of potassium. In the second, the silver is precipitated as cyanide by the cautious addition of cyanide of potassium, care being taken to avoid an excess; the cyanide is washed and then dissolved as before. The strength of the solution is best found by experiment. It should not be too strong, or the silver will not be dense enough; nor too weak, or it will take too much battery power to deposit it. A very good solution is made by dissolving one part of cyanide of potassium in ten

parts of water; adding chloride or cyanide of silver, so long as it continues to be dissolved; next diluting with an equal bulk of water, and filtering; the solution is then ready for use. For small work, glass or earthen ware jars may be used to contain the solution; but on the manufacturing scale, iron or wooden tanks lined with asphaltum are employed. Plates of silver connected with the positive pole of the battery are suspended around the sides of the vessel containing the solution, and the articles to be plated are suspended from a heavy wire that passes over the middle of the vessel. This wire is frequently made into a triangle, which is placed in a vertical position, and suspended by its upper corner from a balance. Weights are then placed in the other pan of the balance, so that when the proper amount of silver has been deposited, the end of the beam to which the articles are attached falls, and in so doing breaks the connection with the battery. A patent recently granted not only provides for thus breaking the current, but also for starting an electric alarm, which gives notice that the work is done. Two Smee's cells will generally give a current strong enough. But in the best shops, one battery runs all the depositing cells, and the strength is regulated for each cell by means of interposed resistances.

In order to make the surface of the deposited silver bright, a little bisulphide of carbon is often added. As a general rule, the more slowly silver is deposited, the more compact it is. This is well shown by the experiment of taking an article and submitting it, while in the bath, to a strong current for a few minutes. It is almost immediately covered with a black coating of silver. If this happens to an article that is to be plated, the only remedy is to remove it by a vigorous application of the scratch brush, and to commence again; for no good work can be done over this black coating.

Electro-gilding is done in the same manner as electro-plating, using a solution of cyanide of gold, instead of silver, and a gold plate in place of the silver. The gilding of the interior of cups and similar articles is accomplished by placing them upon a metallic plate which is connected with the zinc plate of the battery, filling them with the gold solution, and then dipping into them a slip of gold which is connected with the other pole. A very small amount of gold will give a good color to a large surface.

HOW STEEL FILES ARE MADE.

Files are made of the best English cast steel. The rods for the blanks are obtained of such sizes as are suited to the character of the files to be furnished. The first operation is that of forging the blanks from the rods. This is done by blacksmiths who must be very skillful, quick, and exact workmen, as the metal must not be heated above blood-red temperature. All the blanks for each size of the file must be exact in length and swedged to the proper shape, after which the tangs are forged. The next operation is that of annealing them, to render them soft and ductile. This is done by putting them into an annealing oven, or placing them in a box protected from the air by being buried in sand, then heating them to a red heat, and cooling slowly. After this they are ground to a smooth face, and are ready for cutting. The burring or cutting of the fine grooves on the face of files is the most tedious operation connected

with their manufacture. This is performed by workmen who require long practice and great skill of hand and eye to render them experts. They sit at work astride of wooden horses, with their feet in leather stirrups (endless straps), the top of each passing over a file, and holding it firmly down on the anvil. The blank is held upon a sole of pewter resting on an iron block, and each operator cuts the burs with a short broad chisel held in the left hand, and a heavy hammer in his right. This hammer is something of a curiosity; it resembles a crooked necked squash, with a cross slice cut off each end, but for all this it is a scientific *rapper*, notwithstanding its uncouth appearance. Being very heavy to be swung for long periods of time with one hand, were it not crooked downwards the strain of the blows would principally come upon the wrist, whereas it is distributed more equally over the whole arm of the operator, who commences to cut at the point of the blank, and with great dexterity shifts the chisel at every blow, and raps away until he has cut a whole series of angular grooves nearly up to the tang. When one series of grooves are cut, the operative slacks his stirrups, and releases the file. The edge and crossbars of files are cut in the same manner, and the face of the metal is lubricated before each row is commenced. The ridge thrown up by each cut determines the position of the next, and the operator quickly determines the spot to strike by the touch of his finger, which holds the chisel, and is trailed along the surface of the file. The largest sizes of files are cut by men, the smallest by women and girls. The angular grooves of double cut files have their faces in the form of numerous rows of fine hard angular teeth. It frequently happens that the face of blank files are not uniform in their texture as regards hardness. On this account some of the grooves require an additional rap to form the burr. This is a peculiarity which has been very difficult to overcome by any of the machines which have been employed to make these simple tools.

After the files are cut, they are ready for tempering, and are prepared for this process by a thin coating of a composition of salt, brine, flour and charcoal dust, and sometimes pounded cow's hoof. This is to protect the teeth from being burned and from oxydizing when heated. The files are heated in a bath of molten lead, which is always of a uniform temperature. The temperer takes each prepared file singly, dips it into the molten lead, holds it for a few seconds until it is of a red heat, then lifts it out, gives it a rap with a lead hammer on a pewter anvil to knock off the burned scale, and straighten it, if curved, then plunges it into a bath of cold salt brine, and it is tempered. This process must be performed with great tact to avoid the curving of the files by the heat, and consequent cracking when suddenly cooled. After this, the tangs are softened by dipping them in the molten lead and allowing them to cool slowly, in order to remove their brittleness. The files are next scoured with fine sand and water by brushes, then put into limewater, and afterwards thoroughly washed. They are next dried, rubbed over with some oil and turpentine, and are considered finished. Before being packed for market, each file is thoroughly tested by the foreman as to its quality of temper and the burr on its face.

Although all the processes of the file manufacture are but repetitions of

the same operations which are performed every day by the operatives, yet these require long practice and tact to execute accurately. It has been suggested that instead of one, a number of files might be taken up at once by the temperer and submitted to the hardening process in order to facilitate the operations. It has also been suggested that chisels having a number, instead of one edge, might be used by the cutters, and several burrs cut with one blow of the hammer instead of a single one as is now the case. Such suggestions have already been acted upon experimentally without any practical benefit.

Various machines for cutting files have been constructed and put into operation. The work which they have executed looks well, the burrs being beautifully regular, yet such files are not equal in quality to those made by hand labor, hence the latter have the preference and bring the best prices. The hand-made files have a sharpness of burr which machines have generally failed to imitate and yet this appears inexplicable, as it seems reasonable that machinery might be constructed to cut files as well, in every respect, as can be done by hand.

Quite an extensive business is carried on in the re-cutting of worn out files, and in the vicinity of New York there are great numbers of small shops, where such operations are carried on. The old files are first softened by taking out their temper, then they are ground to a smooth face, re-cut, tempered, and finished.

File-cutting was introduced into our country from England, and is now mostly conducted by manufacturers and mechanics who are natives of that country. They have brought to our shores all the skill and industry for which they are so justly distinguished, and they produce files equal in every respect to those made in Europe.

SKINNING AND STUFFING BIRDS.

The preservation of the skins of animals and stuffing them so as to preserve their natural appearance, is an art requiring considerable skill and taste. It is also of great utility in the study of natural history, as well as a very pleasing pursuit for amateur collectors.

It is more difficult to properly prepare and mount bird skins than those of other animals, as the preservation of the plumage in an unruffled and unsoiled state, is the point to be aimed at, and feathers, if broken, are very hard to re-adjust properly.

In killing birds with shot the feathers are very apt to be more or less damaged and soiled with blood, which, if it be permitted to dry on the plumage, will be difficult to remove without some permanent disorder in its arrangement. These evils may be in a great measure avoided if the sportsman will attend to the following directions: He should take the field provided with a small box of cotton wool, a bottle of water, and a small shallow dish of some kind to hold a small portion of water at need. He should also be equipped with some small sable brushes, such as are used in water color painting, and a short piece of stiff wire with the end rounded. As soon as he has shot a bird he should aim to get it in hand as soon as possible, and plug the shot holes with cotton to prevent further bleeding. In doing this he will find the wire above alluded to a very useful instrument. When the bleeding is stopped, he should next cleanse the feathers from the blood which has

already flowed, by using the water which he carries for the purpose and the brushes. If the blood is thus removed before it dries, it can be so completely washed off as to leave no stain even on the whitest feathers, and at the same time their texture may be preserved from damage. Should any of the feathers become so much bent as to be difficult to straighten, they may be restored measurably by soaking in hot water.

Before skinning, the principal dimensions of the bird should be taken and noted down for reference in mounting. The first incision should be made longitudinally backward from the lower point of the breast bone. From the beginning of the operation to the conclusion, all fluids should be constantly absorbed by cotton wool, the greatest care being taken that they do not flow out and soil the feathers. As fast as the skin is separated from the body a thin layer of cotton should be inserted to prevent its adhering to the flesh and for purposes of absorption. Through the incision made as directed the entire process of skinning must in general be performed. When the skin is stripped down from the muscular portions of the legs, they must be cut off on the inside of the skin with scissors or a knife so as to leave the feet attached to the skin. The tail is likewise cut off on the inside at its attachment to the back. The body can then be suspended from a hook and the skinning proceed toward the head by turning the skin inside out. When the wings are reached the skin should, if possible, be removed as far as the joint constituting the elbow, but if it is found difficult to do this without tearing the skin, the bone may be severed as low down as practicable, by use of cutting pliers or strong scissors. Great care will be needed to avoid breaking the delicate membrane which constitutes the external ear upon the heads of birds which are nearly or quite bald. Care is also required in manipulating the eyes, the external membrane of which ought, if possible, to remain unbroken. The brain is removed from the skull through incisions made well back through the roof of the mouth. All loose flesh and fat about the neck, tail, and legs, should be removed from the skin. For this purpose the skin on the wings may be cut through on the inside, when it covers those parts from which the bone and flesh could not be removed. The parts liable to decompose may then be rubbed over on the inside with arsenic, or arsenical soap, which will effectually prevent decay.

The skin is now ready to be stuffed, which although it seems simple in description, requires considerable skill. If glass is not used for the eyes, their orbits should first be stuffed through the mouth with cotton. Next the upper parts of the throat should be filled with the same material. A roll of cotton should now be inserted through the first incision, and pushed up through the neck to the base of the skull. Then the body should be filled, during which process the wires for supporting the bird when mounted should be inserted into the legs, neck, and wings. This completes the process so far as it can be described in words, with the exception of sewing up the opening through which the stuffing has been performed. This requires no special skill to be performed neatly.

Some slight variations in the method are requisite, according to the character of the bird. For instance, a very large bird may require to have the

neck cut off when the skull is reached, and the skinning of the head to be performed by an incision from the outside down the back of the skull.

In mounting birds there is room for considerable display of taste in the adjuncts. A branch of the tree which the bird most affects, with artificial leaves, may be used with good effect as a support for the feet. The natural beauty of the plumage may be enhanced by suitable contrasts of color in the lining of the case where they are kept. An aquatic bird may be shown holding a fish in its mouth, such as it commonly obtains for its food, and many other fancies will suggest themselves to those who wish to excel in the art.

The directions given will, if observed, enable any ingenious person after a little practice to skin, stuff, and mount a bird creditably.

WATCH OIL.

This peculiarly limpid oil, used by watchmakers to oil the works of watches, is drawn from the blackfish. There are many millions of watches in the world, but a drop of this oil goes such a long way that the civilized world uses only about two hundred gallons yearly. Most of this is produced on Cape Cod.

In preparing this jaw oil the heads are tried out carefully and the oil refined by boiling it and finally submitted to a freezing test.

Two or three men furnish the world's supply of this product; they have established their reputations, and control the market; and this old man remarked that the stock on hand was now sufficiently great, and he would not save any more this year. The oil is sold by the producers for from four to eight dollars a gallon.

HOW PAPER COLLARS ARE MADE.

One hundred and fifty million paper collars, it has been estimated, are yearly used in the United States; and statistics show that even this immense number is steadily increasing as improvements in the manufacture multiply.

The collars are made in two varieties: of paper and cloth combined and of paper alone. The best materials are used in the manufacture of the paper. It is supplied in heavy white sheets, sixteen by thirty-six inches in dimensions, weighing 125 pounds to the ream. On being received in the manufactory, it is sent to the enameling room, where each sheet is covered with a thin layer of enamel and then placed on racks heated by steam pipes until thoroughly dry. This work is performed entirely by hand, and the enamel mixture applied with an ordinary brush.

After the sheets have become thoroughly dry, they are embossed to imitate cloth. To produce this effect, muslin is tightly stretched and pasted on plates of tin corresponding in size to the sheets of paper. Between pairs of plates thus prepared the paper is laid, about fourteen sheets at a time being thus arranged, making a pile of alternate layers of paper and tin. The whole is then passed between heavy steel rollers, the pressure being sufficient to imprint the threads of the cloth on the paper, so that a perfect *fac simile* is thus obtained.

Each sheet is then polished by passing it over swiftly revolving brushes, when it is ready to be transformed into collars. The paper is next sent to the finishing loft, where, by means of movable dies made of steel, with edges sharpened so as to penetrate the

material readily, the collars are cut out. A heap of sheets, about eighty in number, is arranged under a press, the die placed upon them, and the press set in motion. A single stroke cuts through the paper, and the collars are shaped. They are now perfectly flat, destitute of button holes, and, besides, must be molded before they are ready for packing.

At one end of the loft are large rolls of starched muslin, the use of which it is at first somewhat difficult to divine. A glance at the next process through which the collars pass soon affords an explanation, for the muslin is seen cut up into little elliptical bits called "patches" which are pasted on the extremities and middle of the collar. Their object is to give the button holes the necessary strength and to prevent them tearing out when soaked by perspiration. A very ingenious machine puts on these patches, cuts the button holes, impresses the imitation of stitches on the borders, folds the collar, and stamps its size on it, all in one motion.

The collars, as fast as they are finished by this machine, are bent or molded so as to fit the neck. The molding apparatus accomplishes its work with astonishing quickness, although it may be fairly considered as rivalled in rapidity of motion by the girls who pack the collars in the boxes. A bundle of a dozen is made up and twisted into its receptacle as if by magic, each girl packing some 20,000 collars per day. The last process is to label the boxes, place them in cases, and the goods are ready for the market.

The cloth lined collars are the most expensive of the two varieties. They are made of paper to which muslin, either white or colored, is firmly pasted, so that no embossing is necessary, and are cut out and finished in the same manner as above described. Cuffs and false shirt bosoms go through the same processes, dies being used of the required forms.

WHEELBARROW.

This invaluable little vehicle is of great antiquity. Pictures in old books show that it was in use as far back as the year 1200. The invention of it has been claimed by several persons who lived long afterward, but the indisputable evidence of these old pictures proves the claims to be unfounded. M. Dupin, a Frenchman, claimed the honor when the wheelbarrow had been in use for more than four hundred years. It has also been accredited to the distinguished Florentine painter, Leonardo de Vinci, who was in his prime in the latter part of the fifteenth century, when the wheelbarrow was already two hundred years old. There are many varieties in use for different purposes, all constructed with a view to the use for which they are intended.

STRAIN OF STRINGED INSTRUMENTS.

The strain of each string on a violin is on an average 50 pounds; on large string instruments it is more, and on an old-fashioned piano it is 100 pounds per string; the new style of pianos, with heavier strings, are subject to double that pull, so that a three-stringed piano of seven octaves is subject to a strain of 200x3x12x7, or 50,400 or over 25 tons. The way to find these numbers is simply to run the end of the string, which otherwise is wound around a peg or screw, over a pulley, and to suspend weights to the string, increasing them until the required tension or pitch is obtained.

MAPS AND CHARTS.

It is singular that mankind lived so long without maps, while they were constantly traveling to and from such parts of the world as were known to them. It is claimed that Anaximander, a citizen of Miletus, made the first one, about the year 570, B. C. The claim is disputed, but on poor grounds. The world as then known included only the southern part of Asia, southwestern Europe, and the north coast of Africa, on the Mediterranean sea. About seventy years after, the shape and size of that sea were correctly defined, and the known world spread a little, on its borders. Two hundred years after, (300 B. C.,) the Eastern hemisphere was so well known that Europe, Asia and Africa were mapped as grand divisions, comprising the world. The names of those three continents are curious. Europe signifies *west*, and *darkness*,—showing that the country was thus named by people living east of it, who saw the setting sun disappear here, and darkness follow. Asia has an opposite signification, meaning *east*, and *rising*. The derivation of the name Africa was lost in the darkness of antiquity more than two thousand years ago.

One of the greatest difficulties experienced by ancient map makers was the proper division of the continents, especially between Asia and Africa.

About 200 B. C., Eratosthenes, the founder of the science of geography, made an enlarged map. From that time until now, new discoveries have constantly been made, and new maps rendered necessary.

Sea-charts were first brought to England by Bartholomew Columbus, a brother of Christopher, in 1489.

Mercator's atlas, famous as the only one which gives the whole world in one map, in parallel lines, was first published in 1556.

Hipparchus, of Alexandria, was the first to teach geography according to a regular system. He started the system of ascertaining latitudes and longitudes by astronomical observation. He died 125 B. C.

The first magnetic chart was made by Dr. Holley, in 1701. It contained only the Atlantic and Indian oceans.

SAND AND MUD BATHS.

Baths of sand or mud have had a reputation, more or less deserved, for centuries; and at the present day are employed to a considerable extent in different parts of the world. By the former, the inhabitants of the eastern shores of the Mediterranean expect to cure their rheumatic and scrofulous troubles. The process of taking this "cure" is very simple; the patient buries himself almost completely in the hot dry sand, and remains thus, some time after a profuse perspiration has broken out; the perspiration is soon followed by a rash upon the skin, which subsides in a few days.

The little benefit arising from this cure is due in the main to the sweating, which frees the blood from impurities through the pores of the skin, which later is locally irritated and excited to greater action by direct contact of the sand.

But the latter, the mud baths, so popular on the continent of Europe, among which those of Salzburg, Franzenbad, and Marienbad in Germany have the highest reputation, are really more beneficial. They are prepared in the following manner: Bog mud is thoroughly dried and sifted, then saturated with mineral water, the mixture being made so soft that the body can sink into it; the temperature is raised

to about 112° Fahr., and the bath is ready. The baths may be either partial or complete, according to the part of the body to be treated; but in either case, the duration of a single bath is from thirty to fifty minutes: after which the body is cleansed by a warm water *douche*. They are taken daily, early in the morning, until relief is obtained. The diseases to which they are particularly suitable are some kinds of paralysis, muscular rheumatism, and the dull nervous pains which follow severe bruises and which are called weather pains. In former times their efficacy was thought to depend upon the large amount of iron and salts contained in them, and which were absorbed into the blood through the pores of the skin. It was even supposed that there existed a magnetic current in the mud, which acted as a strong nervous tonic; but at present, the general belief is that the action is simply that of a universal poultice, giving to the entire surface of the body the heat and moisture which we apply to a sore finger in the bread and milk.

Any one who lives near a bog swamp can extemporize a bath, almost as efficient as those of the celebrated watering places, if he have the time and patience to make it; but instead of mineral water, he can use ordinary boiling water or water in which is dissolved a quarter of a pound of green vitriol and half a pound of rock salt. As the heat and moisture are considered the principal parts of this cure, other substances than mud may be used, which, although more expensive, are yet more cleanly; as, for instance, a fine sand or bran, or any material which will mix well with water and retain the heat for some time.

SPECTACLES invented, 1280.

TO PURIFY TALLOW.

In order to obtain tallow quite free from smell, and to preserve it for a long time without becoming rancid, the following simple process, says the *Chemical Review*, may be used. The fresh tallow is melted in boiling water, and when completely dissolved, and consequently hot, it is passed through a linen filter—it is then boiled along with the water and carefully skimmed—then rendered solid by cooling and washed with water, and lastly separated from it carefully by pressure. It may be melted at a moderate heat and preserved in earthern vessels, covered with a bladder, paper, or good closing lid. If the linen filter is not thick enough to keep other ingredients from passing through besides the liquid tallow and water, it is necessary to repeat the filtration. Tallow thus obtained may be used for ordinary food, for pomades by the addition of pure olive oil, for salves and plasters by the addition of white wax, and may be kept well preserved for a time, as free from smell as when first prepared.

WHITING AND PARIS WHITE.

At the Plymouth works, Bergen, N. J., four huge grinding mills are constantly running, breaking up the chalk and mixing it with water, which is constantly flowing in as the chalk mixture flows on. On leaving the mills, the mixture passes along a series of wooden troughs, where the sand, which has a greater specific gravity than the chalk, is deposited, the chalk passing on into the settling pits, of which there are twenty-four. On being taken from the pits, the whiting is partially dried on a flooring, under which hot flues run. It is then cut up into large rough lumps and placed in

racks on cars which run round on tramways into an immense oven. The heat from the flues in this oven is greatly increased by an air blast, which also carries off the moist exhalations from the drying whiting. Twelve hours on the heated floor, and twelve hours in the oven, thoroughly dries the whiting, and it is ready for packing or the putty factory. The old process of drying, first for twenty-four hours on chalk stones, and then for thirty-six hours on open racks, was not only more tedious, but, from the variations of the temperature, was bad for the whiting for some purposes. These works turn out about twelve tons of whiting a day—between 3,000 and 4,000 tons a year.

Paris white, of a fine quality, is used for finishing parlor walls, adulterating paints, making paper heavier and whiter, etc. For this purpose, what is called cliff stone, a better and harder quality of chalk, is used. Paris white is made much on the same principle as whiting, only being more carefully washed and more slowly dried. Many thousands of tons of cliff stone and chalk, imported from England, are worked up every year.

PALM LEAF.

The Boston trade in palm leaf has always been large. A good year's importation is fully 100,000 bundles. The leaf is mainly brought from Manzanillo, a seaport on the southeast coast of Cuba.

The origin of the trade was in this way: A vessel loaded with mahogany and other West Indian goods was discharging her cargo at one of our wharves when a prominent merchant happening to come to the ship, was attracted by the unfamiliar appearance of a few bundles of what appeared to be husks of some kind. They were palm leaves which had been put on board by accident or for use as dunnage, with no thought of their being of value. The merchant, picking up a leaf, remarked its elasticity and firmness of texture, and as he stood idly braiding the split fibres, the thought struck him that it would be an excellent thing to be braided into hats. He thought the matter over, engaged a cargo, was successful in his venture, and laid the foundation of a large trade. The great use of the leaves, of course, is for hats, the common palm-leaf fan being made from the leaf of a different species of the tree, a dwarf variety.

CARBONATE OF POTASH.

In France, carbonate of potash is manufactured from the residues of molasses after fermentation. After taking out the sugar, or as much as possible, and fermenting the uncrystalized sugar, the residuum from the fermentation (*vinasse*) is evaporated and calcined, and the different salts separated in a very complicated manner. The principal product of this manufacture in the end is carbonate of potash, an extremely valuable article; but up to some years ago it was not possible to obtain that article in sufficient purity by this process, particularly owing to the presence of the cyanides. The cyanide of potassium was in itself a most disagreeable ingredient if it was not completely destroyed, and in trying to destroy it, the result was that carbon was formed in the modification of graobite, and it was quite impossible to burn the potash sufficiently white. It had a gray color, and was not marketable, or rather only marketable at a

very low price. The furnaces are calcining furnaces, and are constructed rather differently from our carbonating furnaces. The working door is exactly opposite the firehole, and the fire escapes through a flue at the top, just above the working door inside. After a certain time the salt gets to that point that it will be impossible to destroy the cyanides, so as to burn out the carbon completely, without fluxing the salt at the same time, because the carbon would be there as graphite, and it is quite impossible to burn it out at a temperature at which the carbonate of potash does not fuse. When it has arrived at that stage, the furnace man fills his furnace with a thick smoke. He then suddenly opens the working door, which is right opposite the fire, and thus burns the smoke throughout the furnace; and it appears as if by a kind of infection, perhaps by the local heat produced right through the salt itself, the cyanide is completely destroyed, and also the graphite burnt off. The product coming from this process is a most beautiful white carbonate of potash of great strength.

MANUFACTURE OF PUTTY.

Only whiting and linseed oil are used; no barytes or other adulteration are introduced. The whiting and linseed oil are roughly mixed in wooden troughs—two gallons of oil to 100 pounds of whiting—and are then shoveled into the mills, 750 pounds forming a batch. The chaser, which is an enormous iron wheel revolving horizontally in a pan like a fountain basin, is at once set in motion. It gradually works the whiting and oil together, two scrapers turning the mass up into a ridge in the center, on the principle of a plow share. In twenty minutes the putty is thoroughly kneaded into a pliable and lubricated mass, and is ready for packing. The daily product of the two mills is about 12,000 pounds. The putty is packed in ox bladders, tubs and barrels; about ten pounds to a bladder, 100 pounds to a tub, and 720 pounds to a barrel. It is amusing to watch the workmen stuffing the bladders. They seize a lump of putty and stuff it into the bladder with their thumbs with astonishing rapidity. A bladder is filled and tied in about ten seconds.

DYEING KID GLOVES.

The dye solutions are brushed over a glove drawn smoothly over a wooden hand. In order to dye black, the glove is brushed after washing it with alcohol, dried and brushed with a decoction of logwood, left for ten minutes, and brushed over once more with logwood. After ten minutes the glove is dipped into a solution of sulphate of iron, and brushed afterwards with warm water. If the color is not dark enough, add a little fustic or decoction of quercitron in the logwood bath. In place of the sulphate of iron, the nitrate may be better employed. When the glove begins to dry, it is rubbed with a little Provence oil and talcum, laid between flannel and pressed. It is then rubbed again with oil and talcum, and drawn on a wooden hand. The glove must not get black on the inside, consequently none of the dye fluid should reach the inside of the glove. Brown is dyed by brushing on a decoction of fustic, red, and logwood, with a little alum. The quantities of dye stuff to be used are regulated according to the tints. For darkening the color a small quantity of solution of sulphate of iron is used. Morocco red is pro-

duced by brushing on a decoction of cochineal, to which a little salt of tin and oxalic acid is added. The tint is easily made darker by adding a little logwood. Gray is produced by brushing on a decoction of sumach, and subsequent treatment with a weak solution of sulphate of iron; greenish gray by the addition of fustic and logwood, also fustic and indigo carmine, to the decoction of sumach. The aniline colors all fix themselves without any further addition by brushing their solutions on the glove. In place of the brush a sponge may be used where it seems suitable. In order to give black a pleasing bluish appearance, after the dyeing it may be washed with a little sal ammoniac. Should the seams in the gloves remain white after dyeing, they are coated with a paste in which a little fat is put.

TRAIN-DISPATCHING.

Very few outside of railroad officials and employees are aware of the laborious and responsible position of the train-dispatcher. Within the last few years such changes and improvements have been made, that the work of running trains has been very much simplified. Much depends on the train-dispatcher, who sits at headquarters and with the aid of a curious chart, at a glance is enabled to see the exact whereabouts of every train on the road at any minute of the day. In miniature he has the entire line before him. Dots and pegs of different size and shape are used to indicate the different trains in motion at the same time. The train-dispatcher with the aid of the chart and an elaborate timecard is enabled to direct operations by telegraph with as much absolute knowledge and intelligence as he could possibly have were he able to give oral commands in a hundred different places at the same time. He is supposed to and does know the size of each passenger and freight train on his divission, the power and speed of each engine, the grade of every mile of the road and where time can be made up when the trains are delayed, to the best advantage. Although the work is done under the advice of the superintendent and manager of the road he is often put in charge of his particular department and held responsible for the proper management of the duties assigned to him, being given a a great latitude and left wholly unhampered. As he keeps a record of the time each train starts from the end of the division, it is constantly under his eye and guidance until it arrives at its destination. He is not called upon to exercise his ingenuity much as long as the trains move on time, it is when a train meets some unavoidable accident or is ditched that the dispatcher finds a field for the excercise of his full powers and shows up to advantage. The regular timecard in such emergencies is of no account and for the occasion he is forced to improvise one. Where, how and when the trains shall meet, which shall have the right of way, where lie on the side track and many other matters which arise out of such a state of affairs, he is called upon to decide. On his knowledge and presence of mind depend the lives of perhaps hundreds of train men and passengers, and a large amount of valuable property. To illustrate some of his daily duties we will suppose the trains are all off time and the train-dispatcher is running them by telegraphic orders issued by himself. Now put on a stretch of track sixty miles long and designate where the five trains going

south will meet five going north, one of the north-bound is a through passenger train with no stops to make and can run at a certain rate of speed; another making all the stops is a local passenger and can run at a rate of speed different from the rest; another is a freight with a light load, and still another freight with a heavy load. One has to climb large hills while another has a part of the road where the grades are not heavy. Plans have to be formed and executed at once to start these trains, and many other things taken into consideration to keep them going without any delay or accidents. Many train-dispatchers on prominent roads handle from one to two hundred trains daily, which fact will give the public some faint idea of the importance of this position.

CAMEL'S HAIR.

It is imported occasionally into the United States, in bales, from Persia *via* England, or directly from Russian ports, and is mostly used in the manufacture of pencils for drawing and painting. Camel's hair is longer than sheep's wool, and often as fine as silk. There are three kinds of colors, black, red, and gray, the darkest of which is considered the most valuable. It is said that the hair on a camel weighs about 10 pounds. In Bokhara the camel is watched while the fine hair on the belly is growing. This is cut off so carefully that not a fibre is lost, and when sufficient has been collected, it is spun into a yarn unequalled for softness, and then dyed all manner of bright colors, and used chiefly for shawls. The Arabs and Persians make of camel's hair, of a less valuable kind, stuffs for carpets, tents, and wearing apparel, and cloth is made of it in Persia.

HISTORY OF THE FLUTE.

The flute under different names and forms, has been in use for more than four thousand years. It was familiar to the Egyptians from a remote period of their history, and among the Greeks and Romans was a favorite pastoral instrument employed also on sacred and festive occasions, in military bands and at funerals. Its present name is derived from the Latin *fluta*, meaning a lampreyan eel, caught in the Sicilian waters, whose side is perforated with seven holes like the flute. The Egyptian flute was from two to three feet long, and was generally played by the performer sitting on the ground; while that of the Greeks probably did not exceed, if it equalled a foot in length. At Athens, it was once in great repute, but was finally superseded by the lyre, the use of which did not distort the face, while it allowed the accompaniment of the voice. In Thebes, Sparta, and other places, however, it continued a favorite. The Spartan flutists were a hereditary order and the Spartan soldiers are said to have marched to battle to the sound "of Dorian flutes and soft recorders." The Egyptians appear from their ancient pictures and sculptures to have blown the instrument through a lateral opening near one end and to have produced the necessary modulations of sound by means of holes on the sides; hence their instrument probably differed a little from the modern fife. The flute of the Greeks and Romans was more in the nature of a fife, and was double as well as single, being often composed of two tubes of reed or wood perforated with holes and played together. Until the early part of the eighteenth century it retained the form of the pipe, and was called the English or common

flute, and sometimes the *flute a bec* from the resemblance of the mouth-piece to the beak of a bird. It was played in the manner of the clarionet and had seven finger holes, but no keys. One of the best German flutists of the eighteenth century was Quantz, the flutist of Frederic II of Prussia. Devienne and Berbignia also acquired a high reputation in France. Among the great flutists of the present century in Germany, were Fuerstenan who died in 1819, and his son who died in 1852. Among celebrated living flutists are Theobald Boehm, flutist of the king of Bavaria, born about 1802, who invented about 1833 a new flute known as the Boehm flute; Jean Louis Tulon, born in Paris in 1786, and professor of the conservatory there; Louis Dronet, born in Amsterdam in 1792, for some time Tulon's rival in Paris; he has resided since 1831 in Belgium, engaged in manufacturing musical instruments. The principal flute manufactories of the present day are Koch and Giegla, Vienna; Clair Godfroy, Paris, and Rudall, Rose and Carte, are the most noted manufacturers in London.

PATENTS.

According to the new Patent Law, approved July 8, 1870, a patent will be granted to any one who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof. Whether the invention claimed be made by a man or a woman, citizen or foreigner, a patent is granted in the name of the person first discovering and perfecting the device. If the inventor die before obtaining a patent, his or her legal representative can procure it.

If inventors unite in any application, the patent issues to them jointly.

If the inventor, before obtaining a patent, assign a portion of the right, the patent will issue to the inventor and purchaser, as assignees, jointly. If the whole of the inventor's right be assigned, the patent will issue to the assignee, but the assignment must first be recorded in the United States Patent Office.

The rules of the Patent Office prescribe that applications for patents should be accompanied by a working model in cases where the nature of the invention admits of one. As a general rule this model must not exceed twelve inches in length, width, or height. It must clearly show every feature of the machine or device, which forms the subject of a *claim* for invention; but should not include other matter, unless necessary to the exhibition of a working model.

The applicant for a patent is required by the law of 1870 to furnish drawings where the nature of the case admits of them.

CAVEAT.—A caveat consists of a specification, drawing, oath, and petition.

It sometimes happens that an inventor has conceived a general idea of some device, the details of which are elaborate and complicated, and which he is desirous of perfecting or simplifying before presenting it to the public, but to accomplish which requires time and repeated experiments.

The patent laws provide for the information of such inventors by allowing them to file a general description of their devices, the objects and purposes of the same, in the secret archives of the Patent Office. This general description is called a *caveat*, and is considered a confidential communica-

tion from the inventor to the Commissioner of Patents.

The inventor is entitled to a notice from the Commissioner of Patents in case any person shall apply for a patent upon the same or similar device during the twelve months that ensue after the caveat is filed.

Only American citizens, or persons who have made oath of their intention to become such citizens, and have resided in the United States one year, are entitled to file a *caveat.*

It is very generally understood that, in order to avoid the operation of laws relating to public use of a device before application for a patent is made, inventors must regulate their movements with profound care and secrecy. This is an error. The law, as now defined, authorizes the public use and sale of inventions for two years prior to the application. If, however, during the time of such public use, any party besides the inventor shall have made and used the same device, the law will protect him in the use of such as he has made, but not in any further manufacture of the article, after the date of the inventor's patent.

By the act of Congress, approved July 8, 1870, it is provided, that all articles made or vended under the protection of a patent must be marked, by affixing thereto the word "patented," together with the day and year that the patent was granted.

In cases where it is impracticable to mark every article, the law provides that they may be sold in packages, and that the word "patented," with the date of patent, shall be printed on the outside of the packages.

No damages can be collected for an infringement of a patent where the inventor fails to comply with these rules.

Stamping or marking the words "patented," "letters patent," or the like, upon any article not patented, subjects the offender to a fine of $100 for each offense.

The following is the tariff of United States fees established by law.

On every application for a design for three years and six months	$10 00
On every application for a design for seven years	15 00
On every application for a design for fourteen years	30 00
On every application for a trade-mark	25 00
On every caveat	10 00
On every application for a patent	15 00
On issuing each original patent	20 00
On filing a disclaimer	10 00
On every application for a reissue	30 00
On every additional patent granted on a reissue	30 00
On every application for an extension	50 00
On a grant of every extension	50 00
On appeal from a primary examiner to examiners-in-chief	10 00
On appeal to the Commissioner from the examiner-in-chief	20 00

According to the new Patent Law the final fee on issuing a patent must be paid within six months after the time at which the patent was allowed, and notice thereof sent to the applicant or his agent; and if the final fee for such patent be not paid within that time, the patent will be withheld, and the invention therein described become public property as against the applicant, unless he shall, within two years from the date of the allowance of the original application, take the steps required to prevent forfeiture.

In most of cases the fees charged by persons who make a business of obtaining patents in United States are as follows:

For preliminary examinations, usually no fee.	
For preparing application, specification, and all necessary papers, and attending to the business until a patent is allowed, in all ordinary cases (drawings excepted)	$25 00
For preparing drawings, the cost thereof, usually	5 00
For preparing and filing caveat	10 00

FOREIGN PATENTS.—In Great Britian,

patents are granted for fourteen years to any person who applies, whether he be the inventor or an importer of the invention. A British patent extends over Great Britain and Ireland only.

In France, patents have a lifetime of fifteen years. Annual fees, $20.

In Belgium, patents are granted for twenty years, the patentee paying a small annual fee.

When foreign patents are desirable, the three countries above named generally afford a better field of operations than all others.

The taking out of a patent in a foreign country does not prejudice a patent previously obtained here, nor does it prevent obtaining a patent here subsequently.

The cost of obtaining a patent in England, France or Belgium, including the agent's fees are about:

For England, gold	$250 00
For France, gold	70 00
For Belgium, gold	50 00

CANADIAN PATENTS.—Under the new Canadian Patent Law, citizens of the United States can secure patents in that country on the same terms as resident Canadians.

If the invention has already been patented in this country, application must be made within one year from the date of the American patent.

Canadian patents will be granted for the terms below mentioned, and the fees, including Government, with expenses of preparing the specifications, original and duplicate drawings, agency, and all charges, are as stated opposite the respective terms, payable in United States currency:

For a patent for five years	$50 00
For a patent for ten years	70 00
For a patent for fifteen years	90 00

The applicant may, at the outset, have the patent issued for either of the above terms of years.

THE HAY STEEL.

A new metal, the "Hay Steel", so-called in honor of the inventor, A. T. Hay of Burlington, Iowa, has recently been put upon the market which seems destined to work quite a revolution in the iron and steel trade. The process of manufacture is peculiar. Iron ore is treated in a cupula furnace around which is coiled several layers of insulated wire. The latter is charged with a current of electricity from a galvanic battery. This makes the cupola and its contents the core of an immense magnet. Iron ore, fire clay and other minerals put into the furnace are subjected to a powerful magnetic action, which greatly intensifies the electro-chemical action, yielding as the product a dark metallic substance which the inventor uses as a flux or sponge in the manufacture of steel, the purification of iron, welding steel, and other processes in metallurgy. The sponge, upon analysis, contains silicon, aluminum, pure iron &c. It has a strong affiinity for sulphur which it eliminates and it forms combinations with other metals that make it highly valuable as a purifier.

In the manufacture of high grades of steel the sponge is added in the Bessemer process and the result is a quality of steel equal to the best crucible steel at a much less cost of production. The Hay steel has been subjected to the most severe tests and has exhibited greater tensile strength, elastic limit, elongation, compression and uniformity of product than any other steel known to the commercial world. The first bridge ever built exclusively of steel was the Chicago, Alton & St. Louis railway bridge across the Missouri River at Glasgow, Mo. It was built exclusively of Hay steel; every chord,

bar, nut and bolt in it is Hay steel, not a pound of iron or other steel being used. It was built in 1878—9. Since then other bridges have been built of the same material with the happiest results.

The Hay process is also being used in the manufacture of steel rails. The sponge, when added to the Bessemer steel, makes a rail that is tougher and less liable to break under strain, concussion or change of temperature. A very high grade of the Hay steel is also used for cutlery and tools, and lower grades for agricultural implements and other purposes where a cheap steel can be substituted for iron to advantage. It is a valuable metallurgic discovery and will work many important changes in the mechanic arts.

THE BLUE LAWS.

Many who have often heard of the Connecticut "Blue Laws," have probably never had an opportunity of perusing that celebrated code. The territory now comprised in the State of Connecticut was formerly two colonies—Connecticut and New Haven. The colony of Connecticut was planted by emigrants from Massachusetts and Windsor in 1633, and Hartford and Wethersfield in 1635–36. The other colony, styled by its founders the dominion of New Haven, was founded by emigrants from England in 1638. The two colonies were united in 1665. The statutes copied below, from an ancient volume relating the history of the American colonies, were enacted by the people of the "Dominion of New Haven," and being printed on blue paper came to be known as "Blue Laws":

The governor and magistrates convened in general assembly, are the supreme power, under God, of this independent dominion.

From the determination of the assembly no appeal shall be made.

The governor is amenable to the voice of the people.

The assembly of the people shall not be dismissed by the governor, but shall dismiss itself.

Conspiracy against this dominion shall be punished with death.

Whosoever says there is power and jurisdiction above and over this dominion, shall suffer death and loss of property.

Whoever attempts to change or overturn the dominion shall suffer death.

Judges shall determine no controversies without a jury.

No one shall be a freeman or give a vote unless he be converted and a member of one of the churches allowed in the dominion.

Each freeman shall swear by the blessed God to bear true allegiance to this dominion, and that Jesus is the only king.

No Quaker, no dissenter from the established worship of this dominion, shall be allowed to give a vote for the electing of magistrates or any other officer.

No food or lodgings shall be offered to Quaker, Adamite or heretic.

If any person turns Quaker he shall be banished, and not suffered to return but on pain of death.

No priest shall abide in the dominion. He shall be banished, and suffer death on his return.

Priests may be seized by any one without a warrant.

No one to cross a river but an authorized clergyman.

No one shall run on the Sabbath day or walk in his garden, or else-

where, except reverently, to and from meeting.

No one shall travel, cook victuals, make beds, sweep house, cut hair or shave on the Sabbath day.

No woman shall kiss her children on Sabbath or fasting days.

The Sabbath shall begin at sunset on Saturday.

To pick an ear of corn growing in a neighbor's garden shall be deemed theft.

A person accused of trespass in the night shall be judged guilty, unless he clears himself by his oath.

When it appears that the accused has confederates, and he refuses to disclose them, he may be racked.

None shall buy or sell lands without permission of the selectmen.

A drunkard shall have a master appointed by the selectmen, who are to bar him from the liberty of buying and selling.

Whoever publishes a lie to the prejudice of his neighbor, shall be set in the stocks, or be whipped ten stripes.

No minister shall keep a school.

Man stealers shall suffer death.

Whoever wears clothes trimmed with gold, silver or bone lace above 1s. per yard, shall be presented by the grand jurors, and the selectmen shall tax the offender £300 estate.

A debtor in prison, swearing he has no estate, shall be let out and sold to make satisfaction.

Whosoever sets a fire in the woods, and it burns a house, shall suffer death; and persons suspected of this crime shall be imprisoned without benefit of bail.

Whosoever brings cards or dice into this dominion shall pay a fine of £5.

No one shall read common prayer books, keep Christmas or set days, eat mince pies, dance, play cards, or play on any instrument of music, except the drum, trumpet and Jew's harp.

No gospel minister shall join people in marriage. The magistrate only shall join them in marriage, as he may do it with less scandal to Christ's church.

When parents refuse their children convenient marriages, the magistrates shall determine the point.

The selectmen, on finding children ignorant, may take them away from their parents and put them in better hands at the expense of their parents.

A man that strikes his wife shall pay a fine of £10.

A woman that strikes her husband shall be punished as the law directs.

A wife shall be deemed good evidence against her husband.

No man shall court a maid in person or by letter, without first obtaining consent of her parents; £5 penalty for the first offence; £10 for the second; and for the third, imprisonment during the pleasure of the court.

Married persons must live together or be imprisoned.

Every male must have his hair cut round according to his cap.

THE DECLARATION OF INDEPENDENCE.

WHO SIGNED IT, WHERE BORN, EDUCATED, ETC.

1. JOHN HANCOCK. Born in 1737 at Boston, Mass.; received a collegiate education, and following the trade of a merchant, was sent to represent Mass. He died in Boston, Mass., Oct. 8, 1793, aged 56.

2. JOSIAH BARTLETT. Born at Amesbury, Mass., Nov., 1729; received a a collegiate education; a physician, representing N. H. Died at Kingston, N. H., May 19, 1795, aged 65.

3. William Whipple. Born at Kittery, Me., in 1730; received a common school education; representative from N. H.; had followed the trades of sailor and merchant. Died at Portsmouth, N. H., Nov. 28, 1785, aged 55.

4. Matthew Thornton. Born in Ireland, 1714; received an academic education; was by profession a physician; representative from N. H. Died at Newburyport, Mass., Jan. 24, 1803, aged 89.

5. Samuel Adams. Born at Quincy, Mass., Sept. 22, 1722; received a collegiate education; was a merchant; representative from Mass. Died at Boston, Oct. 3, 1806, aged 84.

6. John Adams. Born at Quincy, Mass., Oct. 19, 1735; received a collegiate education; was by profession a lawyer; sent as a representative from Mass. Died at Quincy, Mass., July 4, 1826, aged 91.

7. Robt. Treat Paine. Was born at Boston, Mass., March 12, 1731; was a clergyman and lawyer, having early received a classical education; was representative from Mass. Died at Boston, March 11, 1814, aged 83.

8. Eldrige Gerry. Born at Marblehead, Mass., July 17, 1744; received a collegiate education; engaged in mercantile pursuits; was on the delegation representing Mass. Died at Washington, D. C., Nov. 23, 1814, aged 70.

9. Stephen Hopkins. Was born at Providence, R. I., March 7, 1707; received only a common school education; a surveyor and merchant; representing R. I. Died at Providence, R. I., July 13, 1785, aged 78.

10. William Ellery was born at Newport, R. I., Dec. 22, 1727; received a collegiate education; merchant and lawyer, representing R. I. Died at Newport, R. I., Feb. 15, 1820, aged 92.

11. Roger Sherman. Born at Newton, Mass., April 19, 1721; common school education; a shoemaker, merchant and lawyer; representing Conn. Died at New Haven, Conn., July 23, 1793, aged 72.

12. Samuel Huntington. Was born July 3, 1732, at Windham, Conn.; received only a common school education; farmer and lawyer; representative from Conn. Died at Norwich, Conn., Jan. 5, 1796, aged 63.

13. William Williams. Was born at Lebanon, Conn., April 8, 1731; received a collegiate education, and was engaged as a merchant; representative from Conn. Died at Lebanon, Conn., Aug. 2, 1811, aged 80.

14. Oliver Wolcott. Born at East Windsor, Conn., Nov. 22, 1726; collegiate education; representing Conn.; was only known as a statesman. He died at Litchfield, Conn., Dec. 1, 1797, aged 71.

15. William Floyd. Born at Setauket., L. I., N. Y., Dec. 17, 1734; received a collegiate education; engaged in farming; represented N.Y. Died at Westernville, N. Y., Aug. 4, 1821, aged 87.

16. Chris. Livingston. Born at Albany, N. Y., Jan. 15, 1716; after receiving a collegiate education he was engaged as a merchant; represented N. Y. Died at York, Penn., June 12, 1778, aged 62.

17. Frans. Lewis. Was born at Landaff, South Wales; received a liberal education; was a merchant; representing N. Y. Died at New York city, Dec. 30, 1803, aged 91.

18. Lewis Morris. Was born at Harlem, N. Y., in 1726; received a collegiate education, and was known as a scientific farmer; represented N. Y. Died at Morrisania, N. Y., January, 1792, aged 72.

19. Rup. Stockton. Born at Princeton, N. J,, Oct. 1, 1730; received a collegiate education; engaged in the pro-

fession of a lawyer; represented N. J. Died at Princeton, N.J., Feb. 28, 1781, aged 50.

20. JOHN WETHERSPOON. Was born at Edinburgh, Scotland, Feb. 5, 1722; received a collegiate education; was a clergyman; represented N. J. Died at Princeton, N. J., Nov. 15, 1794, aged 73.

21. FRANS. HOPKINSON. Born at Philadelphia, Pa., in 1737; his education was collegiate; his profession the law; represented New Jersey. Died at Philadelphia, Pa., May 9, 1791, aged 54.

22. JOHN HART. Was born about 1716 in Hunterdon Co., N. J.; received a common school education; a farmer; representative from N. J. Died in 1780 in Hunterdon Co., N. J., aged about 64.

23. ABRA CLARK. Born Feb. 15, 1726' at Elizabeth, N.J.; education, common school; was known as the chair manufacturer, lawyer and counsellor; was sent as a representative from N. J. Died at Rahway, N. J., Sept. 15, 1794' aged 68.

24. ROBERT MORRIS. Born in Lancashire, England, January, 1733; a common school education; was a merchant ; representing Pa. Died at Philadelphia, May 8, 1806, aged 73.

25. BENJAMIN RUSH. Born at Philadelphia, Dec. 24, 1745. After he had finished his collegiate education he studied and engaged in the practice of medicine; represented Pa. Died at Philadelphia, Pa., May 8, 1803, aged 67.

26. BENJAMIN FRANKLIN. Was born at Boston, Mass., Jan. 17, 1706; received a common school education; was a printer and philosopher; representative from Pa. Died at Philadelphia, April 17, 1790, aged 84.

27. JOHN MORTON. Was born at Chester, Pa., in 1724; received a home education; engaged in the pursuits of farmer and surveyor; from Pa. Died at Chester, Pa., 1777, aged 53.

28. GEORGE CLYMER. Born at Philadelphia, June 10, 1739. After completing a college course he engaged in mercantile pursuits; was elected to represent Pa. Died at Morrisville, Pa., June 23, 1813, aged 74.

29. JOSEPH SMITH. Born in Ireland in 1715; received a liberal education, (*i. e.*, classical but not a graduate); representing Pa.; he was a surveyor and lawyer. Died at York, Pa., July 11, 1806, aged 89.

30. GEORGE TAYLOR. Was born in Ireland in 1716; had a common school education; engaged as manufacturer of iron; was elected as a representative from Pa. Died at Easton,Pa., Feb. 23, 1781, aged 65.

31. JAMES WILSON. Was born in Scotland in 1742. He received a classical education, and engaged in the practice of the law; representative from Pa. He died in Eatonton, N. C., Aug. 28, 1798, aged 55½ years.

32. GEORGE ROSS. Born at Newcastle, Del., in 1730; received an academic education, and engaged in the practice of the law. Died at Lancaster, Pa., July 15, 1799, aged 69. He was of the Pa. delegation.

33. CASAR RODNEY. Born at Dover, Del., in 1730; education liberal; by profession a lawyer; elected to represent Del. Died near Dover, Del., in 1783, aged 53.

34. GEORGE READE. Born in Cecil Co., Maryland, Sept. 18, 1734; received a classical education, and engaged in the practice of the law; elected to represent Del. Died at Newcastle, Del., in 1783, aged 53.

35. THOMAS M. KEAP. Was born at Chester, Pa., Nov. 19, 1734; education academic; by profession a lawyer; elected to represent Del. Died at Philadelphia, Pa., May 8, 1806, aged 73.

36. SAMUEL CHASE. Born in Sum-

merset Co., Md.; education liberal; a lawyer by profession; of the Md. delegation. Died at Baltimore, Md., June 19, 1811, aged 70.

37. WILLIAM PACA. Native of Hartford Co., Md. Born Oct. 31, 1740; after completing a college education studied law, and was elected as a member of the Md. delegation. Died at Annapolis, Md., 1799, aged 59.

38. THOMAS STONE. Born at Poneton, Md., March, 1743; liberal education; lawyer, representing Md. Died at Alexandria, Va., Oct. 5, 1787, aged 44.

39. CHARLES CARROLL, of Carrollton. Born at Annapolis, Md., Sept. 20, 1737; education, collegiate; by profession a lawyer of the Md. delegation. Died at Carroll's Manor, Md., Nov. 14, 1832, aged 95.

40. GEORGE WYTHE. Born in Elizabeth City Co., Va., in 1726; received his education from his "mother;" a lawyer by profession; was of the Va. delegation. Died at Richmond, Va., June 8, 1806, aged 80.

41. RICHARD HENRY LEE. Was a native of Westmoreland Co., Va. Born June 20, 1732; received a liberal education; studied and was engaged in the practice of medicine when elected as a representative from Va. Died at Chantilla, Westmoreland Co., Va., June 19, 1794, aged 62.

42. THOMAS JEFFERSON. Born April 2, 1743, in Albemarle Co., Va.; collegiate education; lawyer; representative from Va. Died at Montecello, Albemarle Co., Va., July 4, 1826.

43. BENJAMIN HARRISON. Charles City Co., Va., was the *place*, and the time of his birth is not known; at the time of his election as one of the representatives of Va. he was engaged in the business of a planter. He died near Berkley, Charles City Co., Va., April, 1791, aged about 74.

44. THOMAS NELSON, Jr. Was born at Yorktown, Va., Dec. 26, 1728; received a collegiate education; a planter; representative from Va. Died near Yorktown, Va., June 4, 1789, aged 50.

45. FRANCIS LIGHTFOOT LEE. Born in Westmoreland Co., Va., Oct. 14, 1734. His education was liberal; he was a planter and lawyer of the delegation from Va. Died in Richmond Co., Va., 1797, aged 63.

46. CARTER BLACKSTONE. Was born in King and Queen Co., Va., Sept. 10, 1736; after receiving a liberal education he engaged in merchandising; was No. 7, on the roll of delegates from Va. Died at Richmond, Va., Oct. 10, 1797, aged 61.

47. WILLIAM HOOPER. A native of Boston, Mass. Born June 17, 1742; education collegiate, a lawyer, representing N. C. Died at Hillsborough, N. C., Oct. 1790, aged 48.

48. JOSEPH HEWS. Was born at Kingston, N. J., in 1730; his education was liberal: merchant; delegation of N. C. Died at Philadelphia, Pa., while in attendance as a member of Congress, Nov. 10, 1789, aged 49.

49. JOHN PENN. A native of Caroline Co., Va. Born May 17, 1741: was self-educated; a lawyer by profession; representative from N. C. Died at Granville, N. C., Sept. 1788, aged 47.

50. EDWARD RUTLEDGE. Born at Charleston, S. C., Nov., 1749; was a liberally educated lawyer; a member of the S. C. delegation. Died at the place of his birth, Jan 23, 1800, aged 50.

51. THOMAS HAYWARD, Jr. Was born in St. Luke's Parish, S. C., in 1746; academic education; a lawyer; representing S. C. Died near Charleston, March, 1809, aged 63.

52. THOMAS LYNCH, Jr. Born in Prince Geo. Parish, S. C.; received a collegiate education; a planter of the

delegation from S. C. Lost at sea late in 1779, aged 30.

53. Arthur Middleton. Was born on Ashley River, S. C., in 1743; education classical; a planter from S. C. Died near Charleston, S. C., Jan. 1, 1787, aged 44.

54. Button Gwinnett. Born in Eng., in 1732; was the recipient of a liberal education, and, at the time of his election as one of the delegates from Ga., was a merchant. He was killed in a duel near Savannah, Ga., May 27, 1777, aged 45.

55. Lyman Hall. A native of Conn. Born in 1731; was in possession of a classical education, and was engaged in the practice of medicine when sent as one of the representatives from Ga. He died in Burke Co., Ga., in 1791, aged 60.

56. George Walton, Born in Frederick county, Va., in 1740; was self-educated; followed the business of a carpenter, then of a lawyer; was a representative from Ga. Died at Augusta, Ga., Feb. 2, 1804, aged 64.

Charles Carroll, who died November 14, 1832, was the last survivor of the signers, and on the 4th of July, 1828, then over 90 years of age, threw the first shovel of earth on the Baltimore and Ohio R. R., amid appropriate and imposing ceremonies.

USES OF WASTE PAPER.

Few housekeepers are aware of the many uses to which waste paper may be put. After a stove has been blackened, it can be kept looking very well for a long time by rubbing it with paper every morning. Rubbing with paper is a much nicer way of keeping the outside of a teakettle, coffeepot or teapot bright and clean than the old way of washing it in suds. Rubbing them with paper is also the best way of polishing knives and tinware after scouring them. If a little soap be held on the paper in rubbing tinware and spoons, they shine like new silver. For polishing mirrors, windows, lamp chimneys, etc., paper is better than dry cloth. Preserves and pickles keep much better if brown paper instead of cloth is tied over the jar. Canned fruit is not apt to mould if a piece of writing paper, cut to fit each can, is laid directly upon the fruit. Paper is much better to put under carpet than straw. It is thinner, warmer, and makes less noise when one walks over it. Two thicknesses of paper placed between the other coverings on a bed are as warm as a quilt. If it is necessary to step upon a chair, always lay a paper upon it, and save paint and woodwork from damage.

ORIGIN OF THE WATER-CURE.

The water-cure, or hydropathy, owes its origin to the fertility of invention of a Silesian peasant, Vincenz Priessnitz. Having, at the age of thirteen, sprained his wrist, young Priessnitz intuitively applied it to the pump; and afterward, to continue the relief thus obtained, he bound upon it an *umschlag*, or wet bandage. Rewetting this as it became dry, he reduced the inflammation, but excited a rash on the surface of the part. Soon after, having crushed his thumb, he again applied the bandage and the pain once more subsided, but the rash reappeared. He inferred that the rash indicated an impure blood; and this conclusion was strengthened by the result of experiments which he was induced to try upon injuries and ulcers in the case of some of his neighbors, since the rash in some instances appeared after the treatment, and in others did not. Thus

he was led to frame for himself a humoral pathology of all diseases, and a doctrine of the elimination of morbific matters by "crisis." According to this view, the cure of diseases is to be effected by favoring the activity of those organs through which the purification of the system is carried on, and, through a regulated and pure dietary and correct regimen, preventing further morbid accumulations. In his nineteenth year, being run over by a cart, Priessnitz had some ribs broke, and received severe bruises; on learning that the doctors pronounced his case hopeless, he tore off their bandages, and recovered under the renewed application of the *umschlag*, and replaced the ribs inflating the lungs while pressing the abdomen against a window-sill.

PAPIER MACHE.

Articles manufactured and sold under this head may be said to owe their manufacture almost entirely to busy Birmingham, France and Germany having all but entirely failed in doing anything in this branch of fancy and useful industry. In 1872 Mr. Clay is credited with patenting the making in paper of panels for carriages and other vehicles, chimney-pieces, etc. The finest goods are formed by joining together sheets of soft blotting-like paper. A paste of flour and glue is used for this purpose, on a metal model of the shape of the article required to be turned out. Like all goods of the japanned kind, the next process is heating, in an oven of 100 degrees of temperature. After this, come rasping and dipping in linseed oil and tar. Heating follows again, with more rasping and varnishing. After these operations the artist's hand comes in, and frequently, pearl shell and gem inlaying. The pearl is introduced when the lampblack and tar varnish are used. As those of us will know who keep our eyes on the look-out for fine art bargains, there are papier mache trays of a generation gone by, which bear upon them the impress of painters of high genius, and which would now fetch hundreds of times their original cost.

ASBESTOS.

Asbestos, or amianthus is a mineral of a white or greenish white color, found in dense heavy blocks capable of being divided into fibres of greater or less fineness and length, and resembling hair silk; it is smooth and unctuous to the touch, and like plumbago, these qualities are available for lubricating or anti-friction purposes. The mineral is extensively distributed, but much of it is coarse, discolored or in a disintegrated condition, which renders it unserviceable for any purposes to which asbestos has yet been applied. The finest beds are in Corsica and Italy, but a very fair article is found extensively in Canada, Pennsylvania, Maryland, Virginia and other places. Efforts to utilize this mineral were early made in the historic period, and one of the first applications was in the manufacture of incombustible fabric. For this purpose vegetable filaments were combined with the mineral fibre, to give strength and consistency during manipulation, the vegetable fibre being burned away after the formation of the fibre. It had many uses among the ancients. Herodotus refers to cloth made of it by the Egyptians, Varro Strabo and Pliny mention its uses for paper napkins, socks and handkerchiefs. Shrouds of asbestos of the time of the Roman Emperors have been discovered, and are in the muse-

ums of the Vatican and of Naples. Asbestos and animal or vegetable fibre, have constituted the basis of many patents, among which is one to Israel Jennings, in 1828, for its use in packing for pistons, or piston rods, joints, etc. It was also used for safe linings, in 1834. Also, an English patent of 1857, describes a lampwick of silk and asbestos, woven together. Large quantities are used for roofing, and many other purposes.

HOW THERMOMETERS ARE MADE.

The word thermometer, as everybody knows, of course, means "heat measurer," and yet the word, in its etymological signification, conveys what is, or, at least, may be, an erroneous notion of the actual results obtained by means of this useful and interesting little instrument. That heat should be accurately measured, implies that we should be able to start from zero, or no heat. The zero upon our ordinary Fahrenheit thermometers is only thirty-two degrees below the freezing point of water, and this temperature, as is demonstrated by the use of instruments capable of indicating a relatively very low degree, is still as evidently heat, and a good deal of heat, though not so much as that of our scorching July days. We have no more authority for saying that the lowest degree registered closely approaches the lowest, in the nature of things possible, than we have for asserting, that the highest degree attained or measured is the highest degree possible. All that the thermometer does, is, assuming that the cause is proportional to the effect, to indicate by a regularly adjusted scale, the expansion and contraction of a certain substance—for instance, alcohol or mercury—and from this expansion and contraction, we infer that the cause or condition of it—that is, the increase or decrease of heat is proportional to the result. It would not be erroneous to say, that the thermometer measures the relative increase or decrease of temperature, but it does not, and can not, measure heat itself. Yet the uses of the instrument are as various and beneficial as if heat were as absolutely measured, as we can measure the pressure of the air by the barometer, or the specific gravities of liquids by means of the hydrometer. All results, dependent exclusively upon heat, will be uniform, for the same degree of heat; and, using this law, we can reason from one result to another, the results, of course, having been first obtained by experiment, and registered for use.

As an illustration, having once discovered and noted the fact, that water boils in the open air when the mercury of a thermometer, immersed in it, has expanded to the point of 212° on the scale, we may always count on the concomitance of these results, the boiling of water and the registered expansion of the mercury, except under the following circumstances, which, so far as we know, have yet received no explanation. After a thermometer has been exposed for some weeks to the ordinary temperature of the air, if it be suddenly exposed to the temperature of boiling water, its freezing point will often be found to have lowered from one to two degrees. This has been observed in some of the standard thermometers of the Royal Society, London, and by various experimenters. It is sometimes two or three weeks before the freezing point corresponds again with that on the scale.

The determination of the tempera-

ture at which different physical results take place is of incalculable advantage to science and the arts, notwithstanding what has already been said, that the thermometer really does not measure heat at all.

A mercurial thermometer is a very simple instrument. A small glass tube, with a bulb at one end, containing mercury, and a graduated scale, constitute all that is essential to it, yet in this, as in many other cases, simplicity begets difficulty. To make this simple combination perform its duty accurately, is by no means an easy matter. The first difficulty met with, is the want of uniformity in the diameters of the bores of different tubes, and the varying size of the bore in almost every tube. It is scarcely possible ever to find one the caliber of which is the same throughout its length, and, if so found, it is the result of pure accident. It is obvious, therefore, that unless some means of eliminating the errors which would arise from this source, be adopted, nothing like accuracy can be expected in the indications of the instrument. As the character of the bore cannot be altered, the desired result must be obtained in another way.

The method employed to obviate this difficulty is called "calibration." Tubes are selected tolerably free from imperfections, and a column of mercury, of one inch or less in length is introduced into it. The tube is then attached to the frame of a dividing engine, and put in connection with flexible rubber bags, to which pressure is applied, and regulated by screws. The air pressure in one bag being reduced, while it is increased in the other, the mercury column may be forced to and held at any part of the tube.

The mercury being thus brought to the portion of the tube where the graduation is proposed to commence, the exact position of one end of the column is marked upon the tube, a microscope with cross wires being employed to aid the eye of the operator in performing the operation with exactness. By means of the rubber bags, the mercury is again forced along until the end of the column, where the first mark is made, is brought under the microscope cross wires, placed at the other end and so on throughout the entire length intended to be graduated. The varying lengths of the column which are accurately measured in the different positions are recorded, and indicate the variations in the caliber of the tubes. A permanent mark is made at the end, as at the beginning of the calibration.

It will be seen, that if the spaces successively occupied by the mercury be divided into an equal number of equal parts, any one of these parts will indicate a corresponding increase of volume, although the bore of the tube may vary in its diameter.

The required dimensions of the bulb are found, approximately, by weighing a measured length of the mercurial column, and computing the capacity of the bulb from the known expansion of mercury and its specific gravity.

The bulb may be formed upon the tube previous to the calibration, or afterwards attached. In the former case, however, the thermometers have their scale divided after the determination of the freezing and boiling points, and no tubes can be used except such as are found to be approximately perfect. In the latter case, the arbitrary scale, as marked from the calibration, may be reduced after the determination of the freezing and boiling points into the Fahrenheit scale, by the application of a simple algebraic formula.

The boiling point is obtained by placing the bulb in steam having the same elasticity as the atmosphere, a peculiar apparatus, devised by Regnault, being generally employed for the purpose.

The glass tubes, as received, are about a yard long. A boy nicks them with a hard steel knife, and breaks them the length required. The bores, which are flat, are compared, by means of a lens, with those of ten standard sizes, and the tubes assorted accordingly. They are then passed to the blow-pipe table. Each glass-blower has a foot-bellows, and uses an oil lamp. Melting the glass at one end of a tube, he blows it into a bulb by pressing the sides of a hollow India-rubber ball attached to the other, proportioning the size of the bulb to the bore of the tube, and ascertaining the size by using a pair of callipers. While the bulb is yet hot the tube is inserted in mercury, which, as the bulb cools, rises and partly fills it. The tube is then withdrawn and a short India-rubber tube attached at its open end. Into this mercury is poured; that in the bulb is boiled to expel the air, which rises up through the mercury in the India-rubber tube, and an atmosphere of the vapor of mercury now fills the glass tube and bulb. As this condenses, the mercury in the India-rubber tube takes its place, when this tube, without any mercury remaining in it, is removed. The bulb is now warmed, and the open end of the glass tube hermetrically sealed. The bulb and a portion of the tube are immersed in melting ice, and the height of the mercury marked; they are then transferred to a bath at 62 degrees Fahrenheit, and the height marked; next, to a bath at 92 deg. Fahrenheit, and the height again marked. The lengths of the three spaces of thirty degrees each are now carefully measured. If they are exactly equal, the bore is assumed to be uniform and the degrees laid off on the brass scale of the thermometer are all made of the same length. If the spaces of thirty degrees each are not found to be exactly equal, then, by means of a highly ingenious dividing engine, the degrees on the scale are made to increase in length as the caliber of the tube diminishes. When the plate has been divided, and the figures and letters punched, it is passed, laterally, between rollers, to remove the burr left by tools. Were it rolled lengthwise, the accuracy of the dividing would be impaired. The plate is then silvered and lacquered, the glass tube attached, and the whole slidden into the well-known japanned tin case.

ORIGIN OF BRANDY.

Brandy began to be distilled in France about the year 1313, but it was prepared only as a medicine, and was considered as possessing such marvellous strengthening and sanitary powers that the physicians named it "the water of life," (*l'eau de vie*,) a name it still retains, though now rendered by excessive potations, one of life's most powerful and prevalent destroyers. Raymond Lully, a disciple of Arnold de Villa Nova, considered this admirable essence of wine to be an emanation from the Divinity, and that it was intended to re-animate and prolong the life of man. He even thought that this discovery indicated that the time had arrived for the consummation of all things — the end of the world. Before the means of determining the true quantity of alcohol in spirits were known, the dealers were in the habit of employing a very rude

method of forming a notion of the strength. A given quantity of the spirits was poured upon a quantity of gunpowder in a dish and set on fire. If at the end of the combustion, the gunpowder continued dry enough, it exploded, but if it had been wetted by the water in the spirits, the flame of the alcohol went out without setting the powder on fire. This was called the proof. Spirits which kindled gunpowder were said to be above proof. From the origin of the term "proof," it is obvious that its meaning must at first have been very definite. It could serve only to point out those spirits which are too weak to kindle gunpowder, but could not give any information respecting the relative strength of those spirits which were above proof. Even the strength of proof was not fixed, because it was influenced by the quantity of spirits employed — a small quantity of weaker spirits might be made to kindle gunpowder, while a greater quantity of a stronger might fail. Clarke, in his hydrometer, which was invented about the year 1730, fixed the strength of proof spirits on the stem at the specific gravity of 0.920 at the temperature of 60°. This is the strength at which proof spirits is fixed in Great Britain by act of Parliament, and at this strength it is no more than a mixture of 49 pounds of pure alcohol with 51 pounds of water. Brandy, rum, gin and whiskey contain nearly similar proportions.

EFFECT OF CHARCOAL ON FLOWERS.

A horticulturist in England, purchased a rose bush full of promising buds—the flowers, however, were of a faded hue. He covered the earth in the pot about an inch thick with pulverized charcoal, and was surprised, some days afterward, to find the blooms of a fine lively rose color. He repeated the experiment another season with the same result. He then tried the powdered charcoal upon petunias, and found that both the white and violet colored flowers were equally sensitive to its action. It always gave great vigor to the red or violet colors of the flowers, and the white petunias became veined with red or violet tints; the violets became covered with irregular spots of a bluish or almost black tint. Many persons who admired them thought they were choice new varieties from the seed. Yellow flowers appear to be insensible to the influence of charcoal.

MILLING.

Mills for pounding or grinding corn are of the highest antiquity. We read in the Scriptures that Abraham caused cakes to be baked for his guests, of the finest meal; and that the manna was ground like corn. The earliest instrument used for this purpose seems to have been the mortar, which was retained a long time, even after the invention of mills properly so called, because these, perhaps at first were not attended with much superior advantage. It appears then, in the course of time, the mortar was made rigid and the pestle notched at least at the bottom, by which means the grain was rather grated than pounded. A passage of Pliny, not yet sufficiently cleared, make this conjecture probable. When a handle was added to the top of the pestle that it might be more easily driven round in a circle, the mortar was converted into a hand-mill. Such a mill was very little different from those used at present by apothecaries,

painters, potters and other artists for grinding coarse bodies, such as cloves, glass, chalk, etc. There is reason to suppose, that in every family there was a mill of this kind. Moses forbade them to be taken in pawn; for that, says he, is the same thing as to take a man's life to pledge. Michaelis on this passage observes that a man could not then grind, and consequently could not bake bread for the daily use of his family. Grinding was at first the employment of the women and particularly of the female slaves, as it is at present among uncivilized nations and must therefore have required little strength, but afterwards the mills were driven by bondsmen, around whose neck was placed a circular machine of wood so that these poor wretches could not put their hands to their mouths, or eat of the meal. In the course of time shafts were added to the mill that it might be driven by cattle which were, as at present, blindfolded. The first cattle-mills had perhaps only a heavy pestle like the hand-mills; but it must have been soon remarked that the labor would be more speedily accomplished if instead of the pestle, a large cylindrical stone should be employed. It is thought however, that the first cattle-mills had not a spout or a trough as ours have at present; at least the hand-mills which Tournefort saw at Nicaria and which consisted of two stones, had neither; but the meal which issued from between the stones through an opening made in the upper one, fell upon a board or table, on which the lower stone, that was two feet in diameter, rested. The upper mill-stone was called *meta* or *turbo*, and the lower one *cattilus*. *Meta* signified also a cone with a blunt apex; and it has on that account been conjectured that corn was at first rubbed into meal by rolling over it a conical stone flattened at the end in the same manner as painters at present make use of a grinding-stone, and it is believed that the same name was afterwards given to the upper mill-stone. Niebuhr found in Arabia beside hand-mills, some grinding-stones which differed from those used by us in their consisting not of a flat but of an oblong hollow stone or trough with a pestle which was not conical, but shaped like a spindle thick in the middle and pointed at both ends. In this stone, the corn after being soaked in water, was ground to meal and then baked into cakes. The remains of a pair of old Roman mill-stones were found in the beginning of the last century at Adel in Yorkshire. One of the stones was twenty inches in breadth; thicker in the middle than at the edges and consequently, convex on one side. The other was of the same form, but had that thickness at the edges which the other had in the middle, and some traces of notching could be observed upon it. Water-mills appear to have been introduced in the time of Mithridates, Julius Cæsar, and Cicero. Strabo relates that there was a water-mill near the residence of Mithridates and some have ascribed the honor of the invention to him; but there is no doubt that water-mills were, at that period known at least in Asia. The most certain proof that Rome had water-mills in the time of Augustus, is the description which has been given of them by Vitruvius. He says that the ancients had wheels for raising water which were driven by being trod upon by men, and that condemnation to these machines was a punishment. And the pretty epigram of Antipater: Cease your work, ye maids, ye who labored in the mill; sleep now, and

let the birds sing to the ruddy morning; for Ceres has commanded the water-nymphs to perform your task, these obedient to her call throw themselves in the wheel, force round the axle-tree, and by these means the heavy mill. Palladius speaks with equal clearness of water-mills which he advises to be built on possessions that have running water, in order to grind corn without men or cattle. In the year 319 Constantine ordered that all the slaves condemned to the mills should be brought from Sardinia to Rome. In the year 1332 one Bartolomeo Verde proposed to the Venetians to build a wind-mill. In the year 1393 the city of Spires caused a wind-mill to be erected, and sent to the Netherlands for a person acquainted with the method of grinding by it. There was a mill built at Schoonhoven in 1450 and also one at Enkhuisen in 1452, which were at first driven by horses, and afterwards by wind. It is probable that in the early ages men were satisfied with only grinding their corn and that in the course of time they fell upon the invention of separating the meal from the pollard or bran. This was at first done by a sieve moved with the hands; and even yet in France, when what is called *monture in groose* is employed, there is a particular place for bolting, where the sieve is moved with the hand by means of a handle. It is customary, also, in many parts of Dover, Saxony and Alsace to bolt the flour separately, for which purpose, various sieves are necessary. The Romans had two principal kinds *cribra excussoria* and *pollinaria*, the latter of which gave the finest flour called *pollen*. Sieves of horse-hair were first made by the Gauls and those of linen by the Spaniards. The method of applying a sieve in the form of an extended bag to the works of the mill, that the meal might fall into it as it came from the stones, and of causing it to be turned and shaken by machinery, was first made known in the beginning of the sixteenth century. We are expressly told in several ancient chronicles that at Midsummer, 1502, machinery for bolting in mills was first introduced and employed at Gwikaw. Nicholas Boller, who first gave rise to this improvement, being then sworn master of the baker's company. Coarse and not bolted flour, such as is still used in many places and as was used through necessity, at Gwikaw in 1641, was before that period used for baking. It is said that about the year 1533, a freeman of Memmingen taught the people of Appenzal to make the beautiful white bolted flour, so much and so far celebrated. Various machines for the manufacture of bolting cloth, were from time to time invented, until it was systematized and established by regulating the different degrees of fineness by numbers ranging from 0 to 20, the former indicating the coarser and the latter the very finest of Dutch Anchor brand. Bolting-cloth is manufactured at Gera, a few miles from Leipsic Germany, also at Potsdam and Berlin; at the latter place the manufacture of it is carried on by the Jews.

The devices for separating the meal after grinding so as to give the largest amount of "extra" and "superfine," flour are almost innumerable. About twenty years ago it became almost an established fact that in grinding a given quantity of wheat 80 per cent. was to be counted as first grade, and 20 per cent middling or second grade. Recent improvements and inventions have entirely changed this seemingly well established theory, and the 20 per cent. as formerly set down as mid-

dlings or second grade is now so manipulated as to become the highest grade of flour known to the trade, and very far superior to the portion heretofore regarded as "extra." This is brought about by a process known to millers as "high grinding" whereby a large portion is run off into coarse middlings. These middlings are then passed over machines where a series of blast and suction fans are introduced until every particle of impurity is removed and the middlings left are coarse and feel like sand, and are prepared for re-grinding. After being re-ground, the product is bolted through No. 12 to No. 16 cloth and produces a grade of flour far superior to what has been heretofore known as the best. These machines are now coming into very general use, and are generally known as "middlings purifiers." It is a well established fact that their introduction has added from five to ten per cent. to the value of every bushel of wheat raised in the country, besides furnishing consumers with much better flour.

These improvements will doubtless continue until the separation will be so complete that there will be nothing of a kernel of wheat except flour and bran, instead of flour, middlings, ship stuffs, bran and shorts; making two instead of five separations.

AGE OF TREES AND SIZE OF TIMBER.

W. W. Spicer contributes to "Hardwicke's Science Gossip" an interesting article on the above subject. He says:

"The life of a plant is determined by its inner structure, by the laws of its growth, by its power of resisting external injuries, and by other circumstances, many of which are a mystery, and no doubt will ever remain so. But, bounded though it is within limits as narrow and precise as those which hedge round the life of man or the lower animals, there are cases on record of certain members of the vegetable kingdom whose existence has been prolonged for very extraordinary periods.

"The most celebrated of all old trees (and perhaps the most curious, from its belonging to the endogenous division, which does not generally boast of long-lived members) is the Great Dragon tree, of Orotova, in Teneriffe. This monstrous specimen, which came to an untimely end in a hurricane a few months ago, was well known and carefully looked after at the conquest of the island by De Bethencourt in the year 1402. It appears to have been of the same size and appearance then as now—namely, from 70 to 80 feet high, with a hollow trunk of about 20 feet in diameter—whence, judging from the slowness of growth in this family of plants, and the little change that has taken place in four centuries and a half, it is inferred that the tree could not have been less than 5,000 years old at the time of its death. Another giant among the pigmies of modern days is the Baobab (Adansonia), an African tree, specimens of which, growing on the banks of the Senegal river, 60 to 80 feet high, and 30 feet in diameter, were estimated by Adanson to be over 5,000 years old. The Portuguese, on their voyages of discovery, were in the habit of carving their names, etc., on conspicuous trees, as a memorial of their having been the first to visit the spot. Adanson arrived at the age of the trees by comparing the depth of the indentations with the number of 'rings' in the portions of wood overgrowing them. The names themselves bore a date which showed them to have been cut three centuries prior to his visit. It has been suggested that possibly in a

tropical climate these rings may not be so good a test of age as in our more temperate clime, where they are really annual. Nevertheless, allowing that the Baobab forms two rings in each year, in lieu of one, it is still deserving of 'honorable mention.' Yews have a great reputation as long-livers. The care usually taken of them in church-yards and similar places, no doubt tends greatly to their preservation. Thus a yew in the church-yard of Brabourne, in Kent, has, it is believed, reached the enormous age of 3,000 years; another at Fortingal, in Scotland, is quoted at 2,600 years, and others at Crowhurst, in Surrey, and at Fountains Abbey, are put down at 1,400 years. The yew has some near relatives in the cypress, the Taxodium, and the Wellingtonia. Of the first there is a specimen at Grenada, which was a celebrated tree before the Moors were expelled from Spain by Ferdinand and Isabella, toward the end of the fifteenth century. A *Taxodium distichum* at Oaxaca, in Mexico, which in 1829 measured 120 feet in hight by 117 in circumference, is supposed to number forty centuries. It sheltered Hernan Cortez and his little band of adventurers under its wide-spreading boughs about the year 1520. Among the gigantic Wellingtonias (or Washingtonias, as our thin-skinned cousins across the Atlantic will persist in calling them, in spite of priority of title) — among these mammoth trees of California, which reach a hight of 300 or 400 feet, individuals have been observed which must have witnessed 3,000 summers.

"Two other American trees, both Brazillian, have been noticed for their size and probably long lease of life. The first is the Bertholetia, which supplies the 'Brazil nut' of commerce, specimens of which, growing on the banks of the Amazon, have been noticed with more than 1,000 distinct rings. The other is the Hymenæa, in connection with which I transcribe the following passage from 'Lindley's Vegetable Kingdom.' The size of the timber is sometimes prodigious. The locust trees of the west have long been celebrated for their gigantic stature, and other species are the colossi of South American forests. Martius represents a scene in Brazil, where some trees of this kind occurred of such enormous dimensions that fifteen Indians with outstretched arms could only just embrace one of them. At the bottom they were 84 feet in circumference, and 60 feet where the boles became cylindrical. By counting the concentric rings of such parts as were accessible, he arrived at the conclusion that they were of the age of Homer, and 332 years old in the days of Pythagoras; one estimate indeed reduced their antiquity to 2,052 years, while another carried it up to 4,104; from which he argues that the trees cannot but date far beyond the time of our Savior.

"My remaining examples are European. Among them is a chestnut tree growing on Mount Etna, and generally known as *Castagna dicento cavalli*, on account of the immense space which it overshadows. It is 180 feet in circumference, and cannot be less than one thousand years old. A scarcely less celebrated tree is growing at Tortworth, in Gloucestershire. It was a tree 'of mark' in the days of King John. The great lime tree of Neustadt on the Kocher, in Wurtemburg, which as early as 1220 caused the town to be known as *Neustadt an der grossen Linde*, is believed to be not less than 800 years old. Its stem is 38 feet in circumference. At Worms, where there has been lately such a gathering

of crowned and ducal heads to do honor to the memory of the great Reformer Luther, is an elm well known in Germany as the Lutherbaum, which measures 116 feet in hight, with a stem 35 feet in circumference, and has attained an age of not less than 700 years.

"A less venerable member of the vegetable kingdom, though still one that can look back through a tolerable vista of years, is a Judas tree (*Cercis siliquastrum*), in the Botanic Garden at Montpelier; It was planted in 1598, and consequently numbers 270 years. Its trunk a short time ago measured 12 feet round. In 'Science Gossip' of last year, p. 163, was given a short account of a rose, which covers one end of the principal church at Hildesheim, in Hanover. This remarkable climber was well known as 'a monument of the past' as early as 1054. Tradition assigns its origin to the year 814, under Louis the Pious, son and successor of Charlemagne.

"Another tree with a legendary history is a 'Gospel Oak' in my own neighborhood in Hampshire, standing in Avington Park. If we are to believe the stories told of it, and common there in every one's mouth, this 'old, old tree' was spared, at the earnest intercession of certain monks residing at Winchester, solely on account of its great age, when a brother of William the Conquerer leveled the whole of the surrounding forest of Hampage, about A. D. 1076. For some sixteen centuries, therefore, it has defied the storms of winter; but the latter have conquered at last. Ten years ago the old veteran made a final struggle to show some signs of life; and now it stands a hollow trunk, with two or three bare and withered arms, and only prevented from falling by a stout band of iron, with which it is encircled. A mere infant by the side of the Avington tree is the Great Oak of Pleischwitz, near Breslau, whose age is reckoned by Gœppert at 700 years. It was blown down in 1857; its fall being due to a hollow within its huge stem, which could accommodate with ease twenty-five or thirty persons standing upright.

"Dr. A. B. Reichenbach, in his 'Vollstaendige Naturgeschichte,' says: 'We know of limes in Lithunia with 815 annual rings, and a circumference of 82 feet; of oaks in the Polish forests in which one can count 710 perfect rings, and whose stems measured 49 feet round. There are elms whose age is known to be above 350 years, ivy 440, maples 516, larch 570, oranges 640, planes 720, cedars 800, walnut 900, limes 1,000, pines 1,200, oaks 1,400, olives 2,000.' From these numerous examples of extreme old age one may almost conclude that (provided the seed from which they spring be sound, the soil and climate favorable, and the means of nourishment abundant) the existence of many plants may be extended to an indefinite period, should they be fortunate enough to escape accidents from without."

THE NEW PILGRIM'S PROGRESS.

1620. Lands on Plymouth Rock, and sets up for himself.

1621. Keeps Thanksgiving — in no danger of overeating.

1622. Builds a Meeting-house.

1623. Proclaims a Fast Day.

1628. Cuts down a May Pole at Merry Mount as a rebuke to vain recreations.

1635. Is crowded for accommodations and stakes out a new farm at Connecticut.

1638. Makes war on the Antinomi-

ans and the Pequot Indians, and whips both.

1638. Starts a College, and

1640. Sets up a Printing Press.

1643. Goes into a Confederacy—the first Colonial Congress.

1648. Lays down the Cambridge Platform. Hangs a witch.

1651. Is rebuked for "intolerable excess and bravery of apparel," and is forbidden to wear gold and silver lace, or other such gew-gaws.

1652. Coins Pine Tree Shillings, and makes the business profitable.

1663. Prints a Bible for the Indians.

1680. Buys a "hang-up" clock, and occasionally carries a silver watch that helps him guess the time of day. About this period learns to use forks at table; a new fashion.

1701. Founds another College, which, after a while, settles down at New Haven.

1704. Prints his first newspaper in Boston.

1705. Tastes coffee as a luxury, and at his own table.

1707. Constructs another Platform—this time at Saybrook.

1710. Begins to sip tea—very sparingly. It does not come into family use till five and twenty years later.

1711. Puts a letter into his first Post-office.

1720. Eats a potato—and takes one home to plant in his garden as a curiosity.

1721. Is inoculated for the small-pox. Begins to sing by note on Sundays, thereby encountering much opposition and opening a ten year's quarrel.

1740. Manufactures tin-ware, and starts the first tin peddler on his travels.

1742. Sees Faneuil Hall built. The cradle of Liberty is ready to be rocked.

1745. Builds an organ; but does not yet permit it to be played in the meeting-house.

1750. Buys a bushel of potatoes for winter's use—all his friends wondering what he will do with so many.

1755. Puts up a Franklin stove in his best room; and tries one of the newly invented lightning rods.

1760. About this time begins to wear a collar to his shirt.

1765. Shows his dislike to stamped paper, and joins the "Sons of Liberty."

1768. Tries his hand at type founding.

1770. Buys a home-made wooden clock.

1773. Waters his tea in Boston harbor. Plants liberty trees wherever he finds good soil.

1774. Lights Boston streets with oil lamps; a novelty (though "new lights" had been plenty some years before.

1775. Shows Lord Percy how to march to "Yankee Doodle." Sends General Putnam with a small party, to select a site for Bunker Hill monument.

1776. Brother Jonathan—as he begins to be called in the family—declares himself free and independent.

1780. Buys an "umbrillo" for Sundays, and whenever he shows it, is laughed at for his effeminacy.

1791. Starts a cotton spinning factory.

1792. Has been raising silk worms in Connecticut; and now gives his minister (not his wife) a home-made silk gown. Buys a carpet for the middle of the parlor floor.

1793. Invents the cotton gin—and thereby trebles the value of Southern plantations.

1795–1800. Wears pantaloons occasionally, but not when in full dress. Begins to use plates on the breakfast and tea table.

1802. Has the boys and girls vaccinated.

1806. Tries to burn a piece of hard coal from Philadelphia; a failure.

1807. Sees a boat go by steam on the Hudson.

1815. Holds a little convention at Hartford, but doesn't propose to dissolve the Union. Buys one of Terry's patent "shelf clocks" for $36, and regulates his watch by it.

1816. Sets up a stove in the meeting-house, and builds a fire in it on Sunday; an innovation which is stoutly resisted by many.

1817. Begins to run a steamboat on Long Island Sound—and takes passage on it to New York, after making his will.

1819. Grown bolder, he crosses the Atlantic in a steamship.

1822. Lights gas in Boston (but doesn't light Boston with gas till 1829.) At last learns how to make hard coal burn, and sets a grate in his parlor. Buys a steel pen (one of Gillott's, sold at $33 per gross.) Has his every day shirts made without ruffles.

1825. About this time puts a percussion lock on his old musket.

1826. Buys his wife a pair of queer-shaped India-rubber overshoes. Puts on his first false collar. Tries an "experimental" railroad, by horse-power.

1828. Tastes his first tomato—doubtingly. Is told that it is unfashionable to feed himself with his knife—and buys silver forks for great occasions.

1833. Buys his first friction match, then called a "lucifer," and afterwards "loco-foco." Throws away the old tinder-box with his flint and steel.

1835. Invents the revolver, and sets about supplying the world with it, as a peace-maker. Tries a gold pen, but cannot find a good one yet—nor till 1844. Builds a real railroad and rides on it.

1837. Gets in a panic—and out again, after free use of "shin-plasters."

1838. Adopts the new fashion of putting his letters in envelopes (a fashion which does not fairly prevail till seven years later.)

1840. Sits for his daguerreotype, and gets a picture fearfully and wonderfully made. Begins to blow himself up with "Camphene" and "Burning Fluid;" and continues the process for years, with changes of name of the active agent down to and including "Non-Explosive Kerosene."

1844. Sends his first message by the electric telegraph.

1847. Buys his wife a sewing machine—in the vain hope that somehow it will keep the buttons on his shirts. Begins to receive advices from the "Spirit World."

1855. Begins to bore and be bored by the Hoosac Tunnel.

1858. Celebrates the laying of the ocean cable, and sends a friendly message to John Bull. Next week begins to doubt whether the cable has been laid at all.

1861. Goes South to help compose a family quarrel. Takes to using paper money.

1861–5. Climbs the hill Difficulty—relieved of his pack after Jan. 1, 1864; but looses Great Heart, April 14, 1865.

1865. Gets the Atlantic cable in working order.

1865–75. Is reconstructing and *talking about* resumption.

1875. Goes to Bunker Hill to celebrate. Completes the Hoosac Tunnel.

1876. Celebrates his centennial anniversary at Philadelphia, and jingles silver in his pockets.—*J. Hammond Trumball, of the Hartford Courant Almanac.*

OYSTERS.

Among the food treasures of the sea the oyster ranks high in the general esteem, and deservedly so, for she is truly the queen of bivalves. The young "fry" come forth alive; so small that whole troops of them may sport at ease in one single drop of water. It is estimated that a single parent gives birth to two million embryo during the spawning season — May to August. After birth they swim about for a short season, using for the purpose a peculiar pad-like paddle which they use with great skill, and which is *absorbed* for their own sustenance as soon as they have found and attached themselves to their future home. This is usually a stake, reed, stone, shell, or similar solid substance. For this purpose oystermen place bunches of sticks suspended in the water from wires supported by stakes, numerously over the spawning places. If the young do not find an anchorage soon, the tide carries them to sea, from which they are never able to return, so that out of a million only a few hundred may survive. When the young have thus fastened themselves to their anchorage they are called "spat."

At six months old they are an inch or over in length, and ready to remove, and for this purpose numerous sloops and schooners go to Southern waters from the vicinity of New York city and Baltimore to bring the young, now known as "seed," to Northern waters to mature. The seed is sold by the bushel of about 2,500 oysters at 60 cts. When the vessels return the planting takes place. This is simply scattering the seed over the beds, which are located in the edge of salt water where fresh flows in, and the bottom is covered with two or three inches of organic mud or hardpan bottom. Here they are allowed to remain one or two, rarely three years. They are then taken up by means of tongs or dredges —and taken a little way up a fresh water stream to shallow water, and thrown in "to get a drink." This sweetens and cleanses them; here they remain only a short time—a single day or tide will suffice. They are then taken up with forks. After being removed from the stream preparatory to sending them to market they are culled. The smallest size are called "culls." The other size are called "counts," and are sold by the hundred. From this class we get those nice "fries" and luscious "raws" which we so relish.

The yearly returns from the trade is about $6,000,000. It gives employment to about 12,000 men; 800 sailing vessels of all sizes are employed in the trade.

CHAMPAGNE.

The champagne from which the wine takes its name, was an ancient province of France; but of this only the prefectures of Epernay and Rheims produce good wine. The grape generally grown for producing champagne is the black burgundy, it being the singular fact that this wine which is perhaps the whitest of all wines is made from a black grape. Only about one-fourth of the grapes grown in the Champagne district are converted into effervescing wine. The rest are made mostly into red wine by a process similar to that employed in Burgundy. The grapes are picked early in the morning and are carried in baskets to the roadside where they are carefully

sorted, all unripe and unsound berries being cut out by scissors. They are then packed in panniers which are placed on donkeys to be carried home. Here they are emptied directly into presses closely resembling the cider presses used in this country. The wine running from the press when the power is first applied is considered best. After it has stopped flowing the follower is raised, the edges of cake are cut off and thrown into the middle and pressure again applied. This is repeated several times; but the whole process must be completed before the grapes commence to ferment, because the slightest fermentation during the pressing will extract the color from the husks. The must runs into large vats, where it stands from six to twenty hours during which time it throws up a froth and deposits other impurities in the bottom of the casks. The must is carefully drawn off from these into barrels, in which it undergoes the first fermentation. It remains in these barrels until about the first of December; it is then clear and is drawn off from the lees. It is now ready for sale to the manufacturers. The first step in the manufacture is to mix the products of various vineyards so as to produce a wine which shall resemble some particular brand, such as Sillery, Epernay or any other that may be popular at the time. The wine is then fined by means of isinglass, it takes from $\frac{1}{8}$ to $\frac{1}{4}$ of an ounce of this to each barrel. This occupies about a month. If at the end of this time it is not clear, it is drawn off from the lees and fined again. The wine during this process of fining is also treated with sulphur vapor, in order to make it as pale as possible. It is then drawn off, bottled and corked. As soon as the bottles have been corked, they are carried into the cellars and put into immense piles, some houses filling every year several thousand bottles. As the temperature in the cellar increases with the approach of summer, the wine begins to ferment. This is the critical time with the manufacture. Many bottles burst from the pressure of the disengaged gases; but if the breakage does not exceed 8 per cent. by the end of August, no particular measures are taken; if however, it much exceeds this amount, the bottles must be uncorked and recorked. This is a dangerous operation, since oftentimes the bottles explode while in the hands of the workmen. The constant breaking of bottles sounds like a succession of pistol shots; this however, ceases entirely by the end of summer. When the fermentation is finished, the stacks of bottles are overhauled, all broken bottles removed, and those in good order are restacked. These are then allowed to remain at rest until the yeast has settled at the lower side of the bottle, and in this state the wine remains until it is ready for sale. It has yet to be cleared. For this purpose the bottles are placed neck downwards on long benches, pierced with holes, into which the neck fits. The deposit gradually settles upon the cork. This is then removed by skillfully removing the cork and allowing the froth which escapes to carry the yeast with it. The wine is now ready for finishing. As above prepared, it is dry and somewhat deficient in flavor. To impart sweetness of flavor, a certain quantity of *liqueur* must be added. This is prepared from sugar, and some very fine flavored old wine for the better qualities of champagne; but from brandy, wine and sugar, for the more common kinds, every manufacturer however, has his particular re-

cipes; and the *liqueur* also varies with the country to which the wine is to be sent. Thus England requires wine stronger in alcohol, and not too sweet; while in Russia, a very sweet wine is preferred. After the *liqueur* has been added, the bottles are again corked, the corks tied down, the bottles washed and dried, labels attached and the corks covered with tin-foil. The bottles are then wrapped in paper, packed in boxes and baskets, and are ready for market. There are four varieties of champagne; first, the non-effervescent, which was the original wine of the champagne, and may be either red or white; second, the creamy or slightly effervescent; third, the effervescent, which will expel the cork with a moderate report, and gently rises over the mouth of the bottle; fourth, the strongly effervescent which expels the cork with a loud, report and immediately overflows the bottle and a small quantity of which, when poured out will also fill the glass with a foam. These varieties are known respectively as *nonmousseux, cremant, mousseux,* and *grand mousseux.* It is as useless to expect to get good champagne at half price, as it is to buy gold or silver for half its value. The lowest price in Champagne is about $4. per dozen, and a good quality can be bought there for about double this figure. The lowest quality would cost at least $10, per dozen in this country, and there is no limit to the price for the best qualities.

HISTORY OF SOAP.

The first express mention of soap occurs in Pliny and Gaul, and the former declares it to be an invention of the Gauls, though he prefers the German to the Gallic soap. Pliny says that soap was made of tallow and ashes; that the best was made of goat's tallow and the ashes of the beech tree and that there were two kinds of it, hard and soft. The author of a work on simple medicines which is ascribed to Galen; but which however, does not seem to have been written by that author, and of which only a Latin translation has been printed, speaks of soap being made by a mixture of oxen, goat's or sheep's tallow, and a lye of ashes strengthened with quicklime. He says that the German soap was the purest, the fattest and the best; and that the next in quality was the Gallic. This account corresponds more exactly with the process used in Germany at present; whereas the French use mineral alkali and instead of tallow employ oil, which appears to be a later invention. Pliny, in his description, does not speak of quicklime; but as he mentions a mixture of goat's tallow and quicklime a little before, it is probable that the use of the latter was then known at Rome. Gallic and German soap are often mentioned by later writers, as well as by the Arabians; sometimes, on account of their external use as a medicine, and sometimes, on account of their use in washing clothes. The latter purpose is that for which soap is principally employed in modern times; but it does not seem to have been the cause of German soap being introduced at Rome. The German soap with which, as Pliny tells us, the Germans colored their hair red, was imported to Rome for the use of the fashionable Roman ladies and their gallants. In the remotest periods it appears that clothes were cleaned by being rubbed or stamped upon in water without the addition of any substance whatever. Homer says that Nausicaa and her attendants washed their clothes by treading upon them with their feet

in pits, into which they had collected water. It is thought the Egyptian alkali was the strongly burnt ashes of those plants which are still used in Egypt for making salt, and perhaps the same with which the Spaniards were made aquainted by the Arabians, and which they cultivate for making soda. Strabo speaks of an alkaline water in Armenia which was used by the scourers for washing clothes. The ancients made ointments of this mineral alkali and oil; but not hard soap, though by these means they approached nearer to the invention than the old Germans in their use of wood ashes. In Rome, on account of the disagreeable smell attending their employment, the scourers were obliged to reside either in the suburbs, or in some of the unfrequented streets. The principal kinds of soap manufactured in this country are white soap, composed chiefly of tallow and soda, and of olive oil and soda; yellow soap, made of tallow, rosin and soda, and a little palm oil. Soft soap is made with pot ash and drying oils, either alone or mixed with tallow and other coarse fatty matters.

WASHINGTON'S ANCESTRY.

Garsdon, a small town or parish in Wilts county, England, has the honor of containing in its venerable church a monument to the memory of General George Washington's ancestors—a memorial which in the heart of every patriotic American, is replete with associations the most tender and sacred.

The village of Garsdon is about two miles from Malmsbury, and the church is a quaint Gothic edifice, situated in the bosom of a rich country, and surrounded with ancient trees. For generations past the country people of this charming spot have been in the habit of conducting strangers to the church, for the purpose of pointing out this venerable memorial of the architect of the American republic, the Father of his country.

The monument was once a superb specimen of the mural style, and even now presents evidences of rich and curious workmanship. It is to be seen in the chancel on the left side of the altar, and is finely carved out of the stone of that part of the country. It is surmounted with the family coat-of-arms, which forms a handsome emblazonment of heraldry; and although erected more than two hundred years ago; they are still burnished with gilding, and the following interesting inscription appears:

"To ye memory of SIR LAWRENCE WASHINGTON, NITE, Lately Chief Register of ye Chancerye, of Renown, Piety and Charity, an Exemplarye and loving Husband, a tender Father, a Bountefulle Master, a Constant Reliever of ye Poore, and to Thoas of of his Parish a Perpetual Benefactor Whom it Pleased God to Take into Is Peace. From ye Furye of ye Inzuing Warrs. Born May VIV. He was Heare Interred May XXIV., An. Dni., 643, Æ. at. Sue 64. Heare Also Lyeth Dame Anne, Is Wife, who Deceased January XIIIth: and Who Was Beryed XVIth, Anno Dni. 1645."

The ancient English homestead of the Washington family is handsome, very old fashioned, and built of stone, with immense solidity and strength. The timber about it is chiefly oak, and in several of the rooms, particularly the old hall or banqueting room, there are rich remains of gilding, carved work in cornices, ceiling and panels, polished floors and wainscoting, also shields containing the same coat-of-arms as on the mural monument in the church carved over the lofty and antique mantel-pieces.

Beneath the house are extensive cellars, which, with the banqueting room, seem to indicate the genuine hospitality and princely style of living peculiar to

a "fine old English gentleman, all of the olden time." And, indeed, according to the traditions and chronicles of that region of the country, such was the general character of the heads of the Washington family. The walls of the house are five feet thick, and the entire residence is surrounded by beautiful gardens and orchards. In the old paish archives the Washington family are, in frequent instances, most warmly referred to as among the benefactors of the parish; and from the very earliest recorded times they seem to have been the lords of the soil at Garsdon down to the period of their leaving.

DANIEL WEBSTER'S LAST SPEECH.

There are very many speeches by many orators that could very well be spared. Silence would be golden, indeed, compared with such speech. But we cannot afford to lose the following, which is the last speech of Daniel Webster at Washington. It is as pathetic as it is beautiful. It was delivered from the front door of his residence, next the Unitarian Church, to a noisy crowd, who had assembled to rejoice over the nomination of Gen. Scott as the Whig candidate at Baltimore. Mr. Webster, who had expected that he would have received the nomination himself, betrayed no trace of disappointment, but spoke in his deep, melodious voice, "whose every tone was music's own," saying:

"I thank you, fellow-citizens, for this friendly and respectful call. I am very glad to see you. Some of you have been engaged in an arduous public duty at Baltimore, the object of your meeting being the selection of a person to be supported for the office of President of the United States. Others of you take an interest in the result of the deliberations of that assembly of Whigs. It so happened that my name, among others, was presented on the occasion; another candidate, however, was preferred. I have only to say, gentlemen, that the convention did, I doubt not, what it thought best, and exercised its discretion in the important matter committed to it. The result has caused me no personal feeling whatever, nor any change of conduct or purpose. What I have been I am, in principle and character; and what I am I hope to continue to be. Circumstances or opponents may triumph over my fortunes, but they will not triumph over my temper or self-respect.

"Gentlemen, this is a serene and beautiful night. Ten thousand thousand of the lights of Heaven illuminate the firmament. They rule the night. A few hours hence their glory will be extinguished.

> Ye stars that glitter in the skies,
> And gayly dance before our eyes,
> What are ye when the sun shall rise?

"Gentlemen, there is not one among you who will sleep better to-night than I shall. If I wake I shall learn the hour from the constellations, and I shall rise in the morning, God willing, with the lark; and, though the lark is a better songster than I am, yet he will not leave the dew and the daisies and spring upward to greet the purpling East with a more blithe and jocund spirit than I shall possess. Gentlemen, I again repeat my thanks for this mark of your respect, and commend you to the enjoyment of a quiet and satisfactory repose. May God bless you all."

GOLD DISCOVERIES OF AMERICA.

Of all the precious metals, gold appears to have been the earliest known, as well as the most beautiful of all metallic substances. The existence of gold in California was discovered by the expedition under Sir Francis Drake, which sailed from England in 1577, and between that date and 1580 explored the Pacific coast of the Western continent, plundered Spanish settlements, and took possession of California in the name of Queen Elizabeth of England, and circumnavigated the globe. The gold placers of California were mentioned by Loyola Cavello, in an account published in Spain in 1690. The western North American gold field extends comprehensively over the whole mountain region west of the Mississippi river and north of the Isthmus of Te-

huantepec and Yucatan, to the extreme northern line of Alaska, all along the shore of the Pacific ocean, and far eastward toward the interior. Mexico, as early as 1517, was known to the world as a country rich in gold and other precious metals. The Spaniards conceived the Californias to be immensely rich in gold. The first settlement in lower California was by the Jesuit missionaries in 1683. The first settlement in upper California was by the Franciscan Fathers, at San Diego, in the year 1767. On October 25, 1769, a party from San Diego discovered and named the Bay of San Francisco, being probably the first white men ever there. The mineralogy of California is to be noted for its simplicity. Of the 700 or more known mineral species, but about 100 are there to be found. The minerals and metals mined for in California with success, are mostly gold, mercury, copper and silver. Previous to the California excitement, gold had been discovered and the mines worked in North Carolina, Virginia, Georgia, and some in Vermont. In 1848 California was a vast territory, sparsely settled by a few Mexicans, less Americans, and some Indians. At this time, forty-one years ago, the discovery was made which peopled the Pacific coast, California then a Mexican colony subsequently became annexed to the United States by a treaty of peace ratified on the thirtieth of May, 1848. The credit of the discovery of gold in California has been universally conceded to James W. Marshall, who was born in Hope township, Huntingdon county, New Jersey. He started overland to California in company with others about 1844. Some time in the year 1847 Marshall was sent by Sutter up the American river in search of a site for a saw-mill. He found a suitable location at a point on the American fork of the Sacramento river, now known as Coloma, marked a site for a mill, and returned to Sutter's Fort and formed a copartnership with Sutter who agreed to assist him in building the mill. The contract was made August 19, 1847. During the winter the race-way of the mill became damaged. On February 9, 1848, three Americans, of whom two were Mormons, were at work repairing the race-way; Marshall was the overseer, and he had his little daughter with him, who amused herself with the pebbles she found among the freshly dug gravel. This little girl found a lump or nugget of gold in the race-way, and this she presented to her father as a pretty stone. As there were some doubts as to it being gold, Marshall sent the specimen to Mrs. Peter L. Wimmer, who lived at the new mill, and as she had formerly lived at the gold mines in Georgia, he sent it for her opinion. She was boiling soap, and put the metal into the kettle to see if it would corrode, and thus proved it to be gold. Other parties residing in different parts of California heard of the discoveries at Marshall's mill, came there and observed the indications, and returned to prospect in their own neighborhoods with success. The importance of the discovery of gold may be realized when we consider that within a little more than a year, or at the close of 1849, the estimate of United States Commissioner King that 55,000 miners were at work in the gold fields, and that $40,000,000 in dust had been taken, and that the probable yield of the succeeding year, 1850, would be $50,000,000. In 1852 mining was begun in Oregon; soon after gold was discovered in Washington Territory. Rich placer deposits were found in Idaho and Montana in

1860. Comstock Lode was discovered by Allen and Hosea Grosch in 1857. General Custer's expedition found gold in the Black Hills in 1874, and also about that time there was a rush to Leadville, Colorado. The development and extent of our mining industries, which have given us countless millions, and their future, with the constantly improved facilities for developing the same, can hardly be realized. Yet wonders are in store for us.

POWERFUL ORDERS.

In the United States there are over 200 fraternal, benevolent, social, insurance, political, religious, temperance and other secret orders. Following is the official membership of some of the more prominent American organizations: Freemasons, 600,000; Odd Fellows, 635,287; Grand Army of the Republic, 380,000; Knights of Pythias, 210,000; Good Templars, 200,962; Ancient Order of United Workmen, 191,876; Knights of Honor, 124,756; the Royal Arcanum, 80,000; Improved Order of Red Men, 64,000; American Legion of Honor, 61,664; Knights and Ladies of Honor, 49,200; Sons of Veterans, 47,000; Ancient Order of Foresters, 38,539; Daughters of Rebekah, 78,565; Knights of the Golden Eagle, 30,000, and Order of Chosen Friends, 29,271. The total number of Druids in the world is 65,000.

The total number of Odd Fellows in the world is estimated, January 1, 1889, to be 1,458,440. Masonry has 15,838 lodges and 1,082,992 members. The Ancient Order of Foresters has 5,128 courts, 703,556 adult and 37,337 juvenile members—a grand total of 774,868.

SIR JOHN HERSCHEL.

Sir John Frederick William Herschel, Bart., the only son of Sir William Herschel, the celebrated astronomer of the reign of George III., and inheritor of his fame, of Hanoverian descent, was born at Slough, near Windsor, in England, March 7th, 1792. Educated at Cambridge, at St. John's College, he took his degree of B. A. in 1813 with high honors. It was not until after his father's death (1822), that he devoted himself in an express manner to the continuation of the immense work of astronomical research, which his father had carried on through life with such magnificent results. About the year 1825, he commenced a series of observations after his father's methods, and with his father's instruments. In this labor he co-operated for a time with Sir John South. The execution of this undertaking occupied full eight years. For the important results obtained, the Royal Astronomical Society, in 1826, voted to him and Sir John South a gold medal each. In addition to the labors of the survey, he has given the world proofs of his industry and versatility which even alone would have made him famous. In 1836 there appeared in the "Encyclopædia Metropolitana" a "Treatise of Astronomy" by Herschel, proving his power as a popular expositor on the peculiar science of his family.

Before the publication of this work, he had commenced a second great design in astronomy, in continuation and completion of that which he had concluded in 1833. The southern heavens remained to be surveyed. Herschel resolved to add this comparatively unknown hemisphere to the domain of astronomy. In execution of this great design he arrived at the Cape of Good

Hope on the 15th January, 1834. His observations were continued for over four years, at his own expense. In 1847 he published the result of his labors in a large quarto volume. On his return to England in 1838, he was received with every public honor. The Royal Astronomical Society had voted him another medal during his absence. He was made a D. C. L. of Oxford. In 1848, was President of the Royal Astronomical Society. In December, 1850, the office of Master of the Mint was conferred upon him, which position was resigned by him five years after, in consequence of ill health. His death occurred on the 11th of May, 1871, at his seat of Collingwood, near Hawkshurst, Kent.

TRUNKS.

The word trunk is derived from the Latin "Truncus," a chest or coffer covered with leather. The first mention of trunks occurs in Homer's Odyssey, Book viii., where Odyssey receives a trunk filled with costly presents from King Alkinons. Originally trunks were closed with leather straps, ropes, or screws. The trunk above-mentioned was fastened by a rope knotted in a very skillful manner, in a fashion similar to the famous Gordian knot mentioned by Plutarch in his life of Alexander the Great. Locks were not used on trunks before the middle ages. The Greek, Eustathius, considers the invention of locks and keys to be due to the Spartans. Shakspeare, who is very exact in matters of antiquity relating to customs, habits, &c., describes the trunk that was conveyed into the chamber of Imogen, containing the Roman knight Jachimo, says: "I have enough, to the trunk again and shut the spring of it." The nationality of a traveler now days can often be determined by the trunk. Swede and German have large wooden trunks, smaller at the bottom than at the top. The English affect tin trunks ("boxes" are what they call them), or else canvas and paper or sole leather trunks of peculiar pattern. The moderns produced a more useful, the ancients a more ornamental trunk. Trunks of wood or iron of intricate workmanship are now in existence, which show much skilled labor that would be hard to be reproduced.

NUMBER OF EGGS PER ANNUM.

After repeated experiments with the different varieties of chickens, and comparisons with others who have experimented in the same direction, it is concluded that the laying capacities of the principal varieties average about as follows:

Light Brahmas and Partridge Cochins—8 eggs to the pound; lay 130 per annum.

Dark Brahmas—Eggs, 8 to the pound; lay 120 per annum.

Black, White and Buff Cochins—Eggs, 8 to the pound, lay 115 per annum.

Plymouth Rocks—Eggs, 8 to the pound; lay 150 per annum.

Houdans—Eggs, 8 to the pound; lay 150 per annum.

La Fleche—Eggs, 7 to the pound; lay 130 per annum.

Creve Cœurs—Eggs, 8 to the pound; lay 140 per annum.

Black Spanish—Eggs, 7 to the pound; lay 140 per annum.

Leghorns—Eggs, 8 to the pound; lay 160 per annum.

Hamburgs—Eggs, 9 to the pound; lay 160 per annum.

Polish—Eggs, 9 to the pound; lay 125 per annum.

Dominiques—Eggs, 9 to the pound; lay 135 per annum.

Bantams—Eggs, 16 to the pound; lay 90 per annum.

Games—Eggs, 9 to the pound; lay 130 per annum.

TELEPHONE.

There probably has never been an useful invention or discovery but which has been foreshadowed in previous ages, thus verifying the words of Solomon, "there is nothing new under the sun." This is as true of the telephone as it is of the telegraph, the steam engine, printing and other great inventions. Over 200 years ago Robert Hooke, Fellow of the Royal Society, London, Eng., published a work entitled Micographia in which he not only predicts the advent of the telephone but describes "other ways there may be of quickening our hearing or conveying sound through other bodies then [than] the Air: for that is not the only medium. I can assure the reader, that I have, by help of a distended wire, propagated the sound to a very considerable distance in an instant, or with as seemingly quick motion as that of light at least, incomparably swifter then [than] that, which, at the same time, was propagated through Air; and this not only in a straight line, or direct, but in one bended in many angles.

How clearly this describes the acoustic telegraph of to-day with which every school boy is so familiar! The electro-magnetic telephone of Bell, Gray, Edison and other inventors is only another form or application of the principle of sound waves, with the electric current as a conveyor or substitute for the sound wave for long distances. The telephone is a beautiful illustration of the carrelation and transmutation of forces. First the sound wave impinges upon the diaphragm of the transmitting instrument. This is a mechanical motion. The vibration of the diaphragm disturbs the magnetic condition of the polarized core of the magnet. This creates a magnetic force or mode of motion which in turn produces by induction an electric current or wave in the insulated wire surrounding the core of the magnet the circuit of which extends over an insulated metallic conductor any desired distance. Each terminal of the line, after passing through the instruments connects with the ground or a return wire and thus completes the circuit. The change of force from one form to another as described in the transmitting instrument is now reversed at the receiving station. The electric current enters the coil of the magnet and disturbs the magnetic condition corresponding with the electric waves, the magnet attracts and repels the diaphragm and the latter by its vibration generates sound waves in the air exactly corresponding with the original sound waves at the other end of the line, and these, impinging upon the tympanum of the ear of the listener reproduce, but in considerably reduced volume, the words and very intonation of voice of the person speaking at a distance of, perhaps, hundreds of miles. In this form of the telephone the electricity is but the body servant of the original sound wave and performs its duties with wonderful fidelity.

The fundamental principles of the telephone have been known for many ages. It was left to the present age to combine these principles and reduce them to practical use. Pythagoras knew that the pitch of tone depended upon the rapidity of vibration. The Canon Gattoin de Cama observed in 1785 that an iron wire of ten yards in length when stretched in the open air gave forth a sound under the influence of variation in the atmosphere due to the transmission of electricity. Professor Page in America, De La Rive in France Gassiot in London and Marian

in Birmingham discovered that rods of iron placed in the interior of a helix, through which a current of electricity is passed give full sounds when the current is made or broken.

The problem to be solved was to convert the air waves into electric waves for the purpose of transmission. In the toy telephone the vibrations of the membrane of the apparatus used by the speaker are communicated to the taut string and by it to the membrane of the receiving telephone. The distance that sound can be conveyed by this means rarely exceeds a mile and then not always with equal facility on account of the disturbance of the wind, rain storms etc. But if for the string a metal conductor is substituted, and the vibrating diaphragm is made to open and close an electric circuit the distance at which the sound waves may be produced is greatly increased and is limited only by the practical limit of the electric circuit. Instead of the electric circuit, opened and closed by the vibrating diaphragm the same effect is produced by causing the diaphragm to vibrate in close proximity to a fixed magnet around which is coiled insulated wire forming part of the telephonic circuit as already described. There are numerous devices for producing these results and various inventors are almost constantly making new improvements in this wonderful instrument so that but a few years will elapse until the business and social interests of the world will all pay court to this remarkable series of inventions and every house will be in telephonic connection with the rest of the world. For this purpose there have sprung into existence a system of telephonic exchanges by means of which business houses, factories, offices, private residences and public buildings are all connected by wires with a "Central Exchange", where one or more attendants are on duty day and night. A. wishing to communicate with B. signals the central station to that effect. The attendant connects, by means of a switch board, the wires of A. and B. and leaves them connected until their use is no longer desired and, upon a given signal, the two wires are restored to their former separate circuits. Thus citizens in any part of the city can communicate with citizens in any other part of the city and eventually, the system will be extended so as to connect the Central Exchanges of different cities with each other.

Among the prominent inventors of the telephone are A. Graham Bell, Thos. A. Edison and Elisha Gray in the United States and who justly claim priority over the inventors of other countries.

Prof. Hughes, Edison, Bell, Clarence J. Blake and others have contributed largely to many important improvements of the telephonic system, one of the most important of which is the Microphone or transmitter, with which telephonic lines are now equipped. It is based upon the principle that a multitude of fine metallic particles, as a powder, placed in the circuit greatly increases the power of the current to produce vibrations upon the receiving diaphragm. The volume of sound is augmented so that a whisper miles away can be distinctly heard at the other end of the wire. Indeed, so delicate is this instrument that Prof. Hughes was able to hear the foot falls of a fly as it walked over the plate of the instrument, and sounds heretofore totally inaudible to the human ear can now be detected by this simple yet wonderful instrument.

There is almost no doubt the perfected microphone will convey to us

that hidden ripple of the sap rising in growing trees and plants which Humboldt said might be a continuous melody in the auditory organs of earth's smallest creatures.

ORCHARDS.

As there are many persons who are desirous of locating and planting an orchard, and being in some doubt as to the best method, while it is not possible to give specific rules adapted for the different soils, and climatic conditions, of each part of the country, a few general rules laid down will meet the wants of each individual, if properly observed. The principle points have been condenced from the last Reports of the Iowa and Illinois Horticultural Societies, the members of which as a class are intelligent, and meeting annually and discussing the method and results of their labors from year to year, are enabled to arrive at instructive and satisfactory conclusions, for their guidance another season.

Location is one of the important things to be considered. Sloping ground to the northwest or north east, is considered by the majority of fruit growers better than any other exposure, for the reason that the sap would not flow so early in the spring thereby endangering the prospects of the fruit by freezing of the sap. Orchards in low land are more liable to be injured by spring frosts. In locating also much depends upon proper drainage. There appears to be a diversity of opinion about the protection af an orchard, but it is thought advantages are gained by a judicious system of protection by a hedge or a timber belt, the latter being better if about one quarter mile away. The distance to plant the trees should be from twenty four to thirty feet, and have them lean to the southwest and not plant too deep; this will depend however much upon the nature of the location and soil. Plow in the fall and plant the trees in the spring, when the weather becomes suddenly warm after the frost is out of the ground. In planting, place the roots carefully in position before the dirt is made solid, Keep the upper roots out of the way until the lower ones are arranged and solidly impacted with earth. The last dirt should be left loose and untramped. About pruning there appears to be different views, some think the weather is never too cold and many prefer to do their pruning in the winter season. Others think they should be pruned in July or August when the tree is in its best health. It is a good plan to wash the trees about the last of May with a mixture of five parts slacked lime and one part of sulphur as a protection against insects. The next important thing is to know the best varieties of Apples to select, without being obliged to experiment with too many different kinds, and loosing time and space in your orchard. Among the best varieties for summer use are the Red Astrakan, Sops of Wine, Early Harvest and Harvest Red Streak. For fall, the Maiden Blush, Rambo, Fameuse, Dyer, and the Mother which is very fine, also the Talman Sweet. For winter the Ben Davis takes the lead in beauty, size, productiveness, long keeper, popular and profitable. The Grimes Golden is a much finer fruit and can be classed as par excellence, next Rawles Janet, Winesap, the Willow or Willow Twig as it is sometimes called, as a late keeper, and the Jonathan is also one of the best winter apples. While there are many other varieties that are well spoken of; the list mentioned taking all things into consideration will meet the wants of those seeking information on this subject.

PRESERVING HERRING.

The best seasons to obtain good herring are early in the spring, and after the frosts of autumn are fully set in. They are then not only firmer, fatter and more palatable; but more easily preserved, so as to retain their best flavors. The largest are taken in the spring—the most tender and finest flavored in the fall and winter.

When first taken the scales are easily removed. For smoking, canning or preserving in oil or sousing, the removal of all the scales is very essential. "Driving" puts them in the fisherman's possession alive and perfect. A little energetic and careful stirring about in a boat, basket or tub by hand, foot or a stiff, strong stick, as a good vigorous cook would stir corn or oat meal mush, when boiling, will insure the entire removal of all the scales. If this manipulation is neglected till the fish is dead, the removal of the scales becomes not only a difficult operation but so laborious, tedious and expensive that the fish never sell for enough to pay for the trouble.

So soon as caught, scaled and cleaned they are poured into large hogsheads and tubs, and sprinkled very lightly with salt. There is no water needed to form a pickle. The moisture in and on the fish is abundant to dissolve the salt and to form a pickle of sufficient strength to preserve the herring. Fishermen differ, in their judgments, just as much on the quantity of salt to "strike" the herring as curers of hams do on the quantity necessary to cure the ham and yet to retain its fine natural flavor. The design, however, of all is to use only so much salt as an experienced cook would, to make a fresh fish palatable. The herring remain in salt about 30 hours. Early in the morning of the second day after being taken, they are poured on a long table and all the boys, girls and men, connected with the establishment, surround this table for stringing. To accomplish this work, straight sticks three feet long and about five-eighths of an inch in diameter, are previously prepared. Cedar is preferred because of its straight grain, smoothness and elasticity. These sticks are round or octagon, with one end pointed. In stringing, the operator holds the blunt end of the stick in his right hand and with his left he seizes the fish by the back near the gill, which he opens with his left thumb, beside which he places the point of the stick that is quickly thrust through—coming out of the mouth. Each fish is thus sent back to the thumb of the right hand, which holds the stick. The thickness of the point of the thumb forms the gauge for the distance between each fish. Young persons soon become exceedingly expert in stringing herring. So soon as a stick is filled it is placed on horizontal poles—separated a little less than 3 feet—and thus the fish are allowed to be exposed to the dry air until exteriorily they are thoroughly dry.

All the fish put on sticks, so soon as properly aired, are hung in the smoke house. This is usually a tall wooden building divided into "bins." These are made by placing upright scantling on beams 6 feet from the sills and reaching to the rafters. To these are nailed smaller scantling or strips of boards at right angles—separated from each other—vertically—from 9 to 12 inches, and horizontally a little less than 3 feet. These form a kind of ladder on which two or three hands ascend keeping in the same bin, only near enough each other to pass a string of

herring. They begin at the apex of the roof to hang the fish that are sufficiently dried. The sticks reach from one scantling or lath to the other and they are placed quite near each other. The "hanger" descends as he fills up over his head; and thus bin after bin is filled till the lower beams are reached, and so on from bin to bin till the house is filled. Some of the smoke houses hold 1,000 boxes of herring, but the average capacity is about 300 boxes of the size seen in nearly all groceries that keep smoked fish. The fisherman does not wait for a full house before the smoking commences. So soon as he fills a bin, he builds a smoldering fire of green hard wood and keeps it going steadily—moving these fires about according as the process proceeds to his satisfaction. Some partially cover the smouldering fires with the waste hemlock bark of the tan yard; but good beech, birch and maple wood are more easily obtained, near where fish are caught, and on the whole give the fish a better flavor than any other fuel yet discovered on the islands of Passamaquoddy bay, or along the coast of Maine.

The herring should hang above the smoke till they are thoroughly dried, and until its skin attains a fine, bright golden bronze. But it is with fish as with meat; the smoke house is the best place to keep them clean, sweet and pure. There they never sweat, mold or become rancid, so long as an occasional dull fire is kindled. When boxed, the herring should be cool, dry and firm; and then, kept in a dry store, they will long retain their flavor. For persons of good digestion they are excellent food whether broiled, boiled or raw. In the East they are facetiously known as "Quoddy chickens." The interior of the standard box should measure 18 inches long, 10 broad and 7 deep—1260 cubic inches. In canning the process of catching and salting is the same as for smoking; but before putting in cans, the head, gills and intestines are removed. Placed in the can heads and points they stow very compactly. When filled the lid is soldered and an inch hole left open, the same as in the oyster can. The circular piece to cover this is prepared and ready for instant application. The cans are then placed in a large, shallow pan or boiler with water enough in it to come within a half inch of the top of the can. These are placed side by side with the aperture uppermost and the circular piece of tin ready for the solderer at a moment's notice. The water is brought to the boiling point and there continued till the fish are cooked and the steam arising from them excludes all the natural air in both fish and can; then the aperture is closed and hermetically sealed. This is the secret of keeping fish, lobsters, meats and fruits of all kinds, comparatively sweet, fresh and pure for an indefinite period. The addition—when the cans are in the boiling water—of oil, spices, wine, vinegar or other condiments gives the special designation by which one class of goods is known from another.

This mode of preserving fish, flesh, fowl and fruit was discovered in Maine and first practically demonstrated at Eastport—the most eastern town in the United States.

THE CUTTLE FISH.

The cuttle fish belongs to the mollusks, a branch of the animal kingdom distinguished for its members being built upon the plan of a sac. It is distinguished from all other mollusks, such as snails, clams, etc., by having a very large head, a pair of large eyes,

and a mouth furnished with a pair of jaws, around which are arranged, in a circle, eight or ten arms furnished with suckers. In the common cuttle fish or squid of our coast, the body, which is long and narrow, is wrapped in a muscular cloak or mantle, like a bag, fitting tightly to the back, but loose in front. It is closed up to the neck, where it is open like a loosely-fitting overcoat, buttoned up to the throat. Attached to its throat, by a bridle, is a short tube, open at both ends. This tube or siphon, can be moved about in any direction. The animal breathes by means of gills, which are attached to the front of the body, inside the cloak, and look like the ruffles of a shirt-bosom. By means of these gills the air contained in the water is breathed, and they answer the same purpose for the cuttle fish that our lungs do for us. In order to swim, the animal swells out the cloak in front, so that the water flows in between it and the body. Then it closes the cloak tightly about the neck, so that the only way the water can get out is through the siphon. Then it contracts forcibly its coat, and the water is driven out in a jet from the siphon, and the body is propelled in an opposite direction, like a rocket through the water. This siphon is flexible, like a water hose, and can be bent so as to direct the stream, not only forward, but sideways and backward, so that the animal can move in almost any direction, and turn sommersaults with perfect ease; and so rapidly do some cuttle fishes swim, that they are able to make long leaps out of the water. Usually, however, the animal swims backward, with its long arms trailing behind. Our common cuttle fish of this coast has, in addition to its eight arms, two long, slender tenacles, which may be withdrawn into the body. The tail is pointed and furnished with a fin on each side. The octopods, to which the Brazilian cuttle fish belongs, have round, purse-like bodies and eight arms, united at the base with a web, and they swim by opening and shutting their arms like an umbrella; in this mode of swimming they resemble the jelly fish. Cuttle fishes are sometimes used for food by the Brazilians, and different species may be seen in the markets, where one frequently finds them still alive. Sometimes, as we stoop to examine one, its body is suddenly suffused with a deep pinkish glow. Before we have the time to recover our surprise, this color fades, and a beautiful blue takes its place as rapidly as a blush sometimes diffuses a delicate cheek. The blue, perhaps, is succeeded by a green, and then the whole body becomes pink again. One can hardly conceive anything more beautiful than this rapid play of colors, which is produced by the successive distension of sets of little sacks containing fluids of colors which are situated under the skin. The cuttle-fish is also furnished with a bag containing an inky fluid, which, when the animal is attacked or pursued, it ejects into the water, thus completely blinding its adversary and effectually covering its retreat. It is from this fluid the color sepia is made. Besides carrying an ink-bottle, some species of cuttle fish are provided with a long, delicate, horny pen, which forms a sort of stiffener to the back. In some species the pen is hard, thick, and broad, and the cuttle fish bone of commerce is of this kind. The species found in our waters is very small, and not at all dangerous, being barely large enough to draw blood from the hand; but in the tropical seas they are very large, powerful, and dangerous.

MANUFACTURE OF INDIAN INK.

The term, Indian ink, although very ancient, is a complete misnomer. That employed by the French, *encre de Chine*, is the more correct and the one which has some tangible reference to the country whence this indispensable accessory to the drawing office is exported to our shores. A brief account of the method of manufacturing it in the ancient land of Kathay will not be without interest, the more especially as all attempts to prepare it, of an equal quality, in this country or on the continent, have altogether failed. In times so remote as almost to carry us back to the ages of fable, the Chinese executed their specimens of caligraphy through the agency of a piece of bamboo dipped in a kind of black varnish. Subsequently, while the same *stylus* was retained, the liquid was represented by a sirupy fluid, in which particles of a black stone reduced to an impalpable powder were held in mechanical suspension. Later still, the ink assumed the appearance and nature of solid black balls, prepared from lamp black, and ever since their introduction this branch of industry has been gradually improved until it attained its present state of perfection. At the present day the Chinese keep their ink in sticks, rub it with water or tea, and write by means of very fine pointed pencils dipped in it. The quality of the ink varies considerably, and depends upon the purity of the ingredients of which it is composed, and the care and skill displayed in its preparation. Among the best substances from which to obtain the lampblack are—firstly, pig's fat; secondly, ordinary oils and fats; and thirdly, resinous woods and resins themselves. Tolerably good inks are also made from the lampblack produced by the combustion of pine trees, and some other descriptions of timber indigenous to the country.

The materials from which the lampblack is procured are placed in a furnace about one hundred feet in length, and five in breadth, along the sides and top of which it condenses. That which condenses at the extremity of the furnace is the best adapted for the manufacture of the ink, while the rest, which is deposited near the neighborhood of the combustion, is too coarse in grain to be employed for the purpose. This evidently results from two causes. One is the quality of the material, and the other the relative rapidity with which it is consumed. Having obtained the lampblack, the next step is to prepare a particular kind of paste or glue with which to form a compact and solid substance. The preparation of this glue requires a great deal of care and is one of the most important operations connected with the whole process. The best description is made from the horns of deer. After removing the outer skin, the horns are macerated for a period of seven days in rice water, and then subjected to a long and exhausting ebullition. It is only during the cold season of the year that this process is carried on, as hot weather would cause the fermentation of the glue and retard the operation. It must not be imagined that the lampblack is fit for use directly as it is taken out of the furnace. On the contrary, it requires to be sifted through silken bags, so that the grains may all be of the same size, or otherwise the ink would not be homogeneous. This preliminary condition being insured, a certain quantity of the glue is melted and poured over an equal quantity of the other ingredient, and the whole thoroughly kneaded and

incorporated by the hands. Occasionally a small portion of Chinese varnish is added, and the mixture transferred to an iron mortar, where it is beaten up with some degree of violence. The whole of the value of the future product depends, as is usual in all similar instances, upon the intimacy of the mixture, but, at the same time, the operation must not be protracted to too great a length. It is the duty of the manufacturer to time the process, and when, through negligence or ignorance, the proper time has been exceeded, the error is rectified by enveloping the ink in paper, and holding it before a slow fire, which restores to it its elasticity, and prevents it splitting. In spite, however, of this partial remedy, the ink so treated is never equal in quality to that which has not been subjected to such treatment. From the mortar the mixture passes into the hand of the molder. The molds are formed of wood, with a cavity corresponding to the form it is desired to give to the ink. Within certain limits the smaller the cakes the better, as there is less chance of their splitting or warping during the time they are drying. Thus, the best cakes of Indian ink are never of a very large size. As soon as the cakes have acquired a firm and solid consistency, they are removed from the molds and dried. The desiccation is effected by enveloping the ink in very fine paper, and surrounding it by cinders or powdered chalk. When the latter desicator is used, care must be taken that it does not abstract the humidity from the cake with too great rapidity, or the latter will become brittle, and lose its superior quality. The cakes, together with the absorbent envelopes, are placed in a small stove, and kept exposed to a gentle heat for several days. Some manufacturers do not take the trouble to perform this last drying process; but leave the cakes to dry by simple exposure to the air.

Ink of a superior quality rubs easily and marks upon paper, without leaving any apparent trace of solid matter. The best cakes have a brownish hue when rubbed. A black, gray, or blue tinge indicates ink of an inferior quality. The brown tinge will remain in cakes for many years after manufacture, and is visible in some very ancient specimens that exist in China. Another somewhat curious test will determine the quality of Indian ink. If a cake of good quality be struck gently on a hard substance, the sound should be sharp. If it be flat, it is a sign that it is not homogeneous in consistency, and belongs to a second class description. Moreover, the heaviest ink is the most valuable. The Chinese say that the value of lampblack depends upon its lightness, and that of ink upon its heaviness, being in the inverse ratio one to the other. As the ink gets older, so like wine, it improves in quality. It becomes harder without at the same time becoming brittle, and acquires a brilliancy that is highly prized by connoisseurs. Strictly speaking, it ought not to be used for three years after manufacture. Whenever it happens that old ink loses in value by absorbing damp, it may be re-prepared by grinding it with a mixture of glue and water, but the operation is not always successful. In order to keep Indian ink, in other words to preserve it, it should be placed in a well-aired situation, exposed now and then to the action of the sun, and rubbed frequently on the surface to prevent it losing its polish.

The manufacture of Chinese ink, to give it its proper term, is carried on upon a very large scale at Shanghai, where a very superior description is

prepared. The difference in quality between the various inks made in China results from the non-employment of a constant material for the production of the lampblack. In order to impart an agreeable odor to the production, the Chinese add a small portion of musk and camphor, from the Isle of Borneo, two articles which are exceedingly dear in the Celestial empire. Ordinary Chinese ink for home use is not scented in any manner whatever. The gilded mystic letters that are so attractive to young pupils and students are first formed by the action of the mold. When the cake is dry, the letters are traced over with a solution of gelatin in water, and the gold or copper is laid on with a fine brush. Like their neighbors, the Japanese manufacture Indian ink, but consider it of a quality inferior to that which they obtain from the mainland. Not having given so much attention to the matter as the Celestials, they are not so well versed in the manner of preparing the lampblack, which is the real secret of the whole art.

THE BIRMINGHAM DIE-SINKERS.

Die-sinking is a most important branch of Birmingham industry, and has had an existence since the year 1650. It is now almost wholly in the hands of "garret-masters," who work for the larger manufacturers, its wide distribution having chiefly been brought about during the last half-century. It has been well remarked, that as the die-sinker executes almost all, and in some cases quite all, his work for various manufacturing houses, he seldom gets the credit of his performances with the public. Some well-known manufacturer in Birmingham, London, or elsewhere, brings the finished goods into the market, often stamped with his own name, and absorbs the praise justly due to the garret-master, up an entry, in a back street, who is the real author of the work.

The principal departments of die-sinking, in Birmingham, as indicated by the industries in which dies are most largely used, are, says the *Engineer*, coining, medaling, button-making, steel seals, and ornamental metals.

The demand for dies used in coining has been subject to considerable fluctuations, owing, in many cases, to Government interference. In 1812, dies were made for coining gold forty-shilling pieces, of which 800 were struck, the only gold coins ever struck in Birmingham. They were for a banker in Reading, named Monk. Two millions of penny tokens for circulation among the British forces in Spain were struck, in the same year, from Birmingham. The issue of gold tokens was, according to Mr. Timmins, stopped by the Government at the onset, and that of silver, copper, and other metals was, with some temporary exceptions, declared illegal after January 1, 1819. The only coin now produced in Birmingham, is the current copper coin for English and foreign Governments.

Medaling is an important industry, affording considerable employment to the Birmingham die-sinkers. The varieties of medals produced in commemoration of events or individuals are very considerable. Royal births, coronations, marriages, and deaths, anniversaries of schools, churches, chapels, societies, and institutions of almost every kind; weddings, "silver" or "golden;" laying of foundation stones, or inauguration of public buildings, of every popular hero, or as decorations or prizes for schools and

colleges, or for athletic sports. It is noticeable, that almost every metal known to manufacturing industry has been used, at some period or other for striking medals in. An excellent authority, in Birmingham, informs us that most of the ordinary medals are struck either in bronze or tin, the latter carefully refined by the medallist, being the familiar white metal of the "coronation" medals. In bronze medals, the process of "bronzing," which gives their peculiar color, is generally performed before the medal is struck for the last time.

In button-making, the labor of the die-sinker is chiefly expended in livery buttons. The figured gold buttons of the pig-tail period, and the sporting buttons, both in horn and metal, fashionable in the early years of her Majesty's reign, many of them of exquisite workmanship, and by first-class artists, have now almost entirely disappeared.

Steel seals, for public and private use, have enormously increased of late, and, as a manufacturer writes, "the demand has been largely augmented by the limited joint-stock companies recently sprung into existence." The enormous development of the envelope trade, and the equivalent demand for stamped note paper, have opened up for the die-sinker quite a new field of enterprise.

Dies for the stamping of ornamental metals are used, of almost every sort and size, varying from two ounces to two tons in weight. A practical maker remarks that the heavy dies are for the most part cast, and only finished (if finished at all) with the graver or in the lathe. Among the largest dies principally worked by the graver, are those for brass handles and feet, curtain poles, and cornice ornaments.

The process employed, says Mr. Timmins, are simple, though frequently demanding the exercise of great artistic skill and delicacy of manipulation. In ordinary cases a piece of steel is cast of the requisite shape, round which a collar of iron is welded, in order to prevent the steel cracking when hardened. The surface being prepared, the die-sinker sketches his design upon it, and engraves it, employing for the purpose, gravers with edges of three different shapes—one straight, with the corners rounded, and one semi-circular—some forty or fifty sizes of each of these three kinds of gravers being required to suit the varying character of the work, and the special treatment demanded in the several portions of the die. When the engraving is finished, the die is heated and suddenly hardened by cooling; the surface is polished by "lapping," and it is then ready for use in the stamp or press.

SADDLES.

Saddles are not of very ancient invention. In the time of Alexander Severus, as stated by Lampridus, the horses of the whole Roman cavalry had beautiful coverings, and these appear to have been employed generally by the natives of the East. Xenophon reproaches the Persians because they placed more clothes on the backs of their horses than on their beds. These coverings appear to have been gradually transformed into saddles, the invention of which Beckmann thinks may be referred to the middle of the fourth century. The Emperor Theodosius, in 385, by an order restricted the weight of those used for post horses to sixty pounds. Stirrups for supporting the feet hung at the sides of the saddle itself as is supposed, some time in the sixth century. Roman

youths were taught to vault on horseback, and mounting-blocks or stones were generally provided along the roads for the convenience of ladies and other persons, and portable stools were also used. People of rank were assisted by servants; horses, too, were trained to kneel, and spears or lances were furnished with a step, or projection or a loop of leather for the foot. The saddles, bridles and trappings used by the English in the thirteenth century are represented by Strutt as differing little from those of the present time except in the depth of the seat of the saddle. The Saxon and Norman women of that period, whenever they are represented on horseback, are seated sideways agreeable to the present custom. The saddles of the old cavaliers were remarkable for their high peaks before and behind, the seat being a deep hollow between them, and thus very secure. This form is still preferred by Spaniards and Mexicans, and also for military saddles, to the pommel of which are attached the leather holsters for pistols. The McClellan saddle used by the United States cavalry is a modification of it, and is one of the favorite saddles now in use.

WIRE MAKING.

It has been suggested by Beckmann that wire was first formed by cutting up sheets of metal into thin strips. Wirework is but rarely mentioned in the writings of the ancients, and in the few cases that do occur, the metal appears to have been wrought on the anvil. In the more modern works on Technology no mention is made of the *draw-plate*. In the history of Augsburg of the date 1351, and in that of Nuremburg, 1360, the artists who fabricated wire by means of the hammer are called wire-smiths; but as the term wire-drawer (*drahlzicher*) also occurs in these works, it is evident that the draw-plate had been invented, but had not entirely superseded the ancient method. In France the invention is ascribed to one Richard Archal, and iron wire is called in that country *fil d'Archal* and also *fil de Richard*. It is stated that wire was manufactured by hand in England until the year 1565 when one Christopher Schultz, a Saxon, in company with other foreigners, came to that country under the permission granted by Queen Elizabeth to strangers to dig for metalic ores, and introduced the drawing-plate. Previous to this the supply of iron wire together with the combs employed by the woolcombers were chiefly obtained from abroad. In the reign of Charles I., it is stated in a proclamation that iron wire is a manufacture long practiced in the realm, whereby many thousands of our subjects have been employed, and that English wire is made of the toughest and best Osmond iron, a native commodity of this kingdom, and is much better than what comes from foreign parts, especially for making wool-cards, without which no good cloth can be made. And, whereas, complaints have been made by the wire-drawers of this kingdom that by reason of the great quantities of foreign iron wire lately imported, our said subjects cannot be set at work; therefore we prohibit the importation of foreign iron wire and wool-cards made thereof, as also hooks and eyes and other man-manufactures made of foreign wire. Neither shall any translate and trim up any old wool-cards nor sell the same at home or abroad. Previous to the introduction of grooved rollers the rods of iron intended for wire-drawing were hammered out to the required size.

The best iron was used for the purpose, and was sold in rods of about the thickness of the little finger, made up into bundles and called *asteom* or *esteom* iron, or, as in the proclamation of Charles I., Osmund or Orsmund iron. In the modern process the rods are prepared for the wire-drawer at the rolling mill or for some metals by casting, and are generally about the eighth of an inch in diameter; they are sold to the wire-drawer in coils. In order to reduce or draw out the rod into a great length of wire, a number of operations are performed upon it so as to effect the object gradually. The rod is first dragged forcibly through a hole in the draw-plate of somewhat less diameter than itself, and as the metal of the draw-plate is harder than the rod, the latter gives way and becomes extended in length, the substance of the metal is partly kept back, as in a wave, by a narrow ridge within the draw-plate acting as a burnisher. This lengthened wire is again passed through a hole smaller than itself, and thus again elongated.

THE DIVINING ROD.

"It is stated by some writers, and believed in some districts, that the backs of lodes may be followed by particular plants or herbs growing on them. There is some foundation for this idea, but it must not be taken as of unlimited application. The lode is composed of materials different from the ground at its sides; and if softer it will be lower, and the water will naturally flow along it, making the herbage brighter and greener, and nourishing a certain class of plants which will not grow on the dryer and harder soil adjacent. Quartzose veinstone often contains iron pyrites, which are decomposed by exposure to air, and soon producing a somewhat higher temperature, so that snow will melt sooner, and rime and hoar frost will not lie so long upon the line of the lode, and so indicate its presence. In some places it will not require a very acute sense of smelling to detect the presence of a lode by the nose; and anyone who has visited such mining districts as those of Wicklow, which abound in pyrites, will remember the peculiar odor which prevails. In some places sulphurous acid arising from the decomposed lodes may be distinctly tasted. It has also been affirmed, not only in that country and in Hungary, but in late times in the United States, that lodes have been discovered and traced out by means of luminous coruscations playing along them. You will find statements of this kind in Pryce's 'Mineralogia Cornubiensis,' on the authority of credible observers. The mine of Nagybanya, in Transylvania, which is rich in gold and tellurium, was, it is said, discovered by appearances of this sort. Another curious method of searching for lodes is that by means of the 'dowsing rod.' Those who are inquisitive on the subject will find interesting details respecting this system in a curious book published in 1826 by the Count de Tristram, and in 1854 an ingenious book was published on the same subject by M. Chevreuil, a member of the French Academy, 'On the Bagnette Divinatorie (as the French call it); its Use,' etc., which combated the objection raised to the divining rod as a pure deception, and ascribed its action to philosophic causes. The 'dowsing' or 'divining' rod is a forked stick of some fruit-bearing wood, generally hazel, held by the extremity of each prong of the fork in a peculiar way. The

'dowser' then walks over the country he is to try, and when he approaches a mineral deposit the thicker end or handle of the fork turns down in spite, it is said, of all the efforts of the holder to the contrary, and points to the lode. There is no doubt that, owing to the way in which it is held, it has, when once it begins to move, a mechanical tendency to turn. As a general fact, however, it may be taken that it has not led to the discovery of any valuable lodes, and I am inclined to agree with the old author, Agricola, who says 'That a miner ought not to use this enchanted rod, because I want him to be a man skillful in other means, learned in geology and minerology, and able to give a right judgment as to the locality of the lodes without resorting to this questionable art.' Although it seems unnecessary to discuss seriously anything so doubtful as this 'divining rod,' many eminent persons have believed in it. A very clever man, Mr. Cookworthy, of Plymouth, the first man to apply to useful purposes the china clay of Cornwall, was a great adept at the use of the 'divining rod,' and a French ecclesiastic in 1862 was making a handsome income by discovering springs of water by its aid. A case occurred in Cornwall in which what is called the Chiverton lode was said to have been discovered by the 'divining rod.'"

THE FIRST SILK HAT.

Its Invention over Ninety Years Ago.

The first silk hat, made of plush, was manufactured by George Dunnage in England, in the year 1794. Dunnage appears to have been a hatter of an inventive turn of mind, for he also made a ventilating hat, in which the tip was made separate from the side crown, with whalebone slides, which allowed it to be raised or shut down at the pleasure of the wearer.

Dunnage called his silk hat a "waterproof hat in imitation of beaver," and it is described in the Repertory of Arts, vol. 4, page 302. In this description it is announced that "the hat is made of shag, woven of such count in the reed and cut over such sized wire as will give the hats to be manufactured from it that degree of richness or appearance of fur which may be thought necessary." The materials to answer this purpose best were those "made with two poles, either of bergam, Piedmont or organzine silk, rising alternately in a reed of about nine hundred count to eighteen inches wide, with three shoots over each wire."

This silk shag, or plush, was stretched on a dyer's frame and the pile set upright with a comb. The back of the plush was then stiffened with size made of isinglass or kid leather. After the size dried the plush was carded with a fine card until it was completely taken out of the twist or throwing.

The plush was then, while still on the frame, "water-proofed" on its back by applying to it several coats of "linseed oil well boiled, thickened with a small quantity of any good drying color." For very fine colors the inventor recommended poppy oil or copal varnish. This was put on until all the pores of the material were completely filled up. After it was aired, and the odor of the oils completely gone, the superfluous grease was removed from the plush with ox-gall or lime water.

The plush was then ready for hat-making. The crown was "made over a block with a needle and silk, the oiled side downwards." The seams were flattened, and "the edges of the stuff

pared off very near the stiches." The seams were then gone over with the prepared oil, and the crown turned. It was then stiffened on the inside by sticking to it any suitable substance for a body. The sticking substance was made of a paste of gum arabic, starch and glue.

Dunnage also gives directions for making and joining the brim, and the hat was then "loured" (veloured) and dressed in the same manner as felt hats.

A silk hat was made on a wire body in Glasgow some twenty years after Dunnage's invention.

COBALT---ITS PROPERTIES AND USES.

In olden times the word cobalt was used to designate a whole group of worthless metals. The miners of those days were full of superstition, and imagined that the genii of the mountains would resist all attempts to penetrate their mysteries, and hence they were supposed to throw all sorts of false ores and unripe metal in the way of the workmen for the sake of discouraging them from their undertaking. The name of the mountain gnome or sprite was Kobold, and hence the miners called the worthless ore "Cobalt." The bright shiny ore that vexed the workmen so much was at one time supposed to contain bismuth, and was very little used.

These are the first recorded notions, but there is little doubt that cobalt ores were used for coloring glass some thousands of years before, in Nineveh, Thebes, and Pompeii, as specimens found in those places resemble the beads and ornaments of modern times.

The first really authentic discovery of cobalt appears to have been made in 1735, by the Swedish chemist Brandt, who called it Cobalt King. Chemical analysis had not attained sufficient progress in that early day to enable any one to separate the constituents of ores with absolute certainty, and it was not until 1780 that the existence of cobalt was confirmed by Bergmann. Cobalt is one of the metals found in the atmosphere of the sun, and in the materials that are of extra mundane origin. It usually occurs associated with nickel, arsenic, and sulphur, and is frequently an incidental product in the working of copper, bismuth and nickel ores.

The best known minerals are smaltine, called also speiss cobalt, cobaltine, or glance cobalt, cobalt bloom and earthy cobalt. The fact that some of the minerals contain arsenic has lead to applying the name of cobalt to the black arsenic sold as a fly powder. It will be seen from the above list that this element is by no means so abundant as manganese or nickel, and in the event of its being required for certain purposes in the arts, it would be difficult to obtain it in large quantity.

There are several ways in which metallic cobalt can be prepared from its compounds, one of the earliest of which was from the oxalate. It is possible to reduce the oxide by heating two parts of the pure oxide of cobalt and one part of pure cream of tartar, for six hours, in a covered crucible lined with charcoal and at a temperature sufficient to melt steel. The regulus obtained in this way is exceedingly hard and brittle, and has the color of bismuth, is magnetic, and has a specific gravity of 8.43. By re-melting in a clay crucible it can be freed from carbon, and it then has a silver-white color, specific gravity of 8.754, is softer than steel, very elastic, does not oxidize in air, nor after several days'

immersion in water, and is as magnetic as iron. Becquerel found that by electrolysis a brilliant white metal goes to the negative electrode when the chloride of cobalt is first neutralized with ammonia. Prepared in this way it is quite pure, and is malleable and magnetic. By treating an aqueous solution of the chloride of cobalt with sodium amalgam, an amalgam of cobalt is formed from which the mercury can be expelled, and the cobalt obtained in the condition of a fine powder; it can afterwards be fused to a pure regulus.

The above are the chief methods for obtaining the pure metal, and we can now pass to the consideration of some of its properties.

The metal resembles steel, with a slight red tinge, is very hard, and is said by Deville to be more tenacious than iron. This latter property may hereafter give a value to wires made of cobalt where it is required to attain great strength in small compass. Arsenic and manganese render it brittle. Like pure iron it requires a very high heat to melt it, and the temperature of fusion appears to be between that of iron and gold. Its specific heat is 0.1096, and its density ranges between 8.513 and 8.7.

It is said to be magnetic when perfectly pure, and can be converted into a magnet by contact. At a very high temperature cobalt burns with a red flame yielding an oxide. Acids generally dissolve cobalt, nitric acid being especially adapted to this purpose. The metal decomposes water at a red heat, but not at ordinary temperatures. Plunged into fuming nitric acid, it is converted into the passive state, the same as iron, and the duration of this passive state is augmented by previously heating the metal.

Antimony and cobalt fused together evolve heat and light, and afford an iron-gray alloy. The alloy of cobalt and iron is exceedingly hard. Gold and cobalt yield a yellow and very fragile alloy.

The alloy of platinum and cobalt is fusible. Cobalt amalgam is white, like silver. Silver is rendered brittle by it. Alloys of lead and cobalt, and tin and cobalt, have been made but possess little interest.

Many chemists suppose nickel to be an alloy of cobalt and some other metal. Fairbairn found that the tenacity of cast iron was greatly reduced by its mixture with nickel, and the same result is probable in the case of cobalt. Cobalt is said to reduce copper from solutions. Weiske found that cobalt was contained in nearly every brand of commercial iron he examined, sometimes to the extent of seven grammes in 100 pounds.

Finely divided metallic cobalt is soluble in a boiling solution of caustic potash, and yields a blue liquid which is supposed to contain cobaltic acid. The finely divided cobalt for this purpose is prepared by heating an intimate mixture of pure oxide with ten or twelve per cent. starch meal, or by reducing the oxide with hydrogen.

Cobalt contaminated with phosphorus has a different color from ordinary metal, and loses its lustre in the air.

We can now speak of some of the compounds of cobalt that find application in the arts. The oxides and salts are distinguished for their beautiful colors—red, blue, yellow, green—hence they were early used for pigments.

If a little oxide of cobalt be added to melted glass, we obtain a mass, which, after cooling is intensely blue. When this is ground to powder it yields the

well-known smalt that at one time was extensively employed by papermakers and in the laundry. The color is very fast, as it is not affected by the atmosphere or by acids or other liquids—and this fact afforded a method of detecting adulterations, as sand or pulverized glass, which was simply immersed in some coloring liquid, could easily be washed clean by an acid.

Since the extensive and cheap manufacture of artificial ultramarine, was established, the demand, and naturally the supply, of smalt, have greatly diminished. There is another blue color formed by the union of alumina and the oxide of cobalt, known as Thenard's blue, which has long been applied in the arts, but in consequence of its high price cannot compete with ultramarine. It can be prepared by mixing 3 parts freshly precipitated moist phosphate or arsenate of cobalt with 12 to 15 parts also freshly precipitated hydrate of alumina, and exposing, after drying, to a red heat. Thus produced it is a compact, insoluble mass, which can be ground to a fine blue powder. Rinmann's green, which is a compound of the oxides of zinc and cobalt, we described under the head of the compounds of zinc. It is a much-prized green pigment. A beautiful yellow color is produced by mixing the nitrite of potash with a solution of cobalt. A double nitrite of cobalt and potash is produced in the form of an insoluble yellow crystalline body, which is not only of value as a color but offers a remarkably delicate test for the presence of cobalt in solutions. This yellow has been used sparingly, on account of the expense, in aquarelle and oil painting.

By precipitating cobalt with phosphate of soda we have a red violet color, the shade of which varies according to the temperature at which it is prepared.

A fine cobalt brown is produced by calcining a mixture of sulphate of cobalt, ammonia, and iron.

Some of the salts of cobalt, when they contain water, are red, when they are anhydrous they appear blue. This property is made use of in what is called sympathetic ink. If we write with a dilute solution of chloride of cobalt on paper and allow the tracing to dry at ordinary temperatures, the letters will scarcely be visible. Upon the application of heat the writing becomes visible, with a blue color, or sometimes green if nickel be present. The color again disappears on the absorption of moisture.

A fine green color is produced by precipitating cobalt from its solutions by means of a mixture of prussic acid and potash, but the cost of production must prevent any extensive application of this color.

Since the discovery of photography, the use of cobalt blue glass has greatly increased. It is an interesting fact in optics that blue glass permits all of the chemical rays of light to pass freely through it, while the yellow rays are intercepted. Pieces of blue glass are used to eliminate the yellow rays when the colors of flames are to be examined for the violet hue of potash, and in other cases of optical research.

The oxide of cobalt, prepared by precipitating the chloride with potassa, has been employed in rheumatism. It is emetic in the dose of 10 to 20 grains. The salts of cobalt are irritant poisons.

The employment of metallic cobalt in the manufacture of German silver would make that article too expensive for general use, but in small quantities it enters into alloys in association with nickel as an incidental component. The deposition of metallic cobalt by the battery can be accomplished the same

as is now so extensively done with nickel, and this method is sometimes resorted to, to procure small quantities of the metal. Some of the salts of cobalt are of great value to the chemist in his laboratory, as affording delicate tests for the presence of other bodies.

One of the methods for the manufacture of oxygen gas from bleaching powders, is founded upon the somewhat obscure formation and subsequent decomposition of cobaltic acid. A very small quantity of a solution of cobalt suffices to evolve all of the oxygen from chloride of lime.

HISTORY AND MANUFACTURE OF SAWS.

The saw was doubtless used among the Hebrews for the cutting of wood, though this is not mentioned in the Bible. It was used for the cutting of stone and also as an instrument of punishment. The ancient Egyptians made use of saws of bronze, and applied them to cutting out planks from logs. The saws were single-handed, like those now used by carpenters, and the log to be cut by them was placed on end and firmly secured to posts set in the ground. The inventor of the saw was deified by the Greeks and called by some Talus and by others Perdix. Having once found the jawbone of a snake, he employed it to cut through a small piece of wood; and by these means was induced to form a like instrument of iron,—that is to make a saw. This invention, which greatly facilitates labor, excited the envy of his master and instigated him to put Talus to death privately. Upon being asked by some one, when he was burying the body, what he was depositing in the earth, he replied, a serpent. This suspicious answer discovered the murder. The saws of the Grecian carpenters were made like the straight frame saws of modern times, the blade set across the middle of the frame with the teeth perpendicular to its plane.

Saw blades cannot be too good; the various operations they have to pass through "punishes" the steel so much, so to speak, that unless it is entirely uniform in quality and homogeneous throughout, it will never be satisfactory, or do good service.

The steel is melted in crucibles as in all other steel works, and rolled into sheets subsequently. The ingots for cross cut saws are of peculiar shape, however, and after being cast are subjected to a thorough forging under heavy hammers to render them tough and uniform throughout. Circular saws are also formed from ingots varying in weight from ordinary sizes up to 300 pounds. These are forged out under very heavy steam hammers, and subsequently reduced to the proper thickness by rolling in the ordinary way. After being rolled, they are laid out and brought to the proper size and then straightened into perfectly flat disks. This straightening is an art, or a branch of the art, peculiar to itself, as any inexperienced person can readily discover by undertaking to straighten, or "take the buckle out," of a piece of sheet metal. He will straighten one edge and and make the other crooked, or the centre will bulge out; in short, all his labor comes to nought, for the more he hammers it injudiciously the more mischief he does, and he will acknowledge that there is skill and judgment required for so apparently simple an act as straightening a saw plate.

Toothing the saw, in the case of the circular and larger blades, is done under a hand press by punching them in

an obvious manner; but with the ordinary carpenters' saw, and those for wood sawing, the teeth are cut in a machine with extreme rapidity. They are fed through in front of a rapidly revolving cutter, at a certain speed, which nicks out one tooth at every revolution, so that the rapidity with which the teeth are made is marvelous to the uninitiated. The attendant stated that the average rate was about twelve saws per minute.

When the saw blades have been passed though the necessary processes previously, they are tempered, ground and polished. The hardening is done by plunging the heated plates into oil baths. The tempering is quite a different and distinct operation, and one extremely interesting in all respects. The thin plates leave the oil baths at a viterous hardness, glass hard, in fact, so that when struck over an anvil they will fly into fragments. This quality has to be taken from them and the requisite elasticity and toughness imparted instead.

Further, when the blades come out of the oil baths wherein they are hardened, they are more or less buckled or crooked, some of them much more than less, and any one but an expert would say that the material was spoiled; but this defect is soon remedied. The hardened plates are removed to a burning fiery furnace quite as uncomfortable as the one of old wherein Shadrach and his brethren tarried awhile. In this furnace there is a cast iron disk made perfectly true on its upper face and supported by a vertical shaft. This shaft is capable of being raised and lowered with the die by a hydraulic ram beneath. Over this die is another —the two constituting a pair of highly heated platens, or hot press. When the die is hot enough, the previously hardened saw blades are placed on it, a dozen or so at a time, and the two are brought together with a force of six tons, which has not only the effect of drawing the temper of the blades to a proper degree of toughness, but also of taking out all the warp and curl, so that they are to the uninitiated observer "good enough;" they are not good enough for the critical workmen, however, who show you that, although apparently correct and true, they are still far from perfect.

The plates leave the hot dies of a dull, dead black, and have to be polished and otherwise brought to a better finish. The polishing is done with emery, in machines or rubbers with a reciprocating motion which imparts that fine, straight grain observable in the blades. This operation also has the effect of taking the spring out of the blades, so that if bent or twisted by accident in using them, a permanent injury would result. They are therefore put through another process, which is merely heating them, in an oven, to a straw color. This restores all the stiffness lost in polishing and handling them after they were tempered. The color put on them in the oven is removed by washing them with acid. After this they are immersed in an alkali to destroy the effects of the acid, dried in sawdust and handed over to the handlers.

Circular saws are ground as they are used in the mill. They are suspended vertically and ground on both sides at once, the other processes they pass through being identical with those previously described. Mill and cross cut saws are ground on a curious looking apparatus, which is in fact a quadrant. The saw is held on the arc of the quadrant, which receives a vibratory motion on its axis by suitable mechan-

ism, and the stone revolves against it, having, in addition, a sidewise motion imparted, so that it travels across the face of the saw, making it wholly equal in all parts.

The handles are made of domestic woods, chiefly beech and apple, and are first sawn out on a belt saw and afterward rounded, rasped, and bored in a manner that will be readily comprehended by most workmen.

HARDENING SAWS AND SPRINGS.

Saws and springs are generally hardened in various compositions of oil, suet, wax, and other ingredients, which, however, loose their hardening property after a few weeks' constant use: the saws are heated in long furnaces, and then immersed horizontally and edgewise in a long trough containing the composition; two troughs are commonly used, the one until it gets too warm, then the other for a period, and so on alternately. Part of the composition is wiped off the saws with a piece of leather, when they are removed from the trough, and they are heated, one by one, over a clear coke fire, until the grease inflames; this is called " blazing off."

The composition used by an experienced saw maker is two pounds of suet and a quarter of a pound of beeswax to every gallon of whale oil; these are boiled together, and will serve for thin works and most kinds of steel. The addition of black resin, to the extent of about one pound to the gallon, makes it serve for thicker pieces and for those it refused to harden before; but the resin should be added with judgment, or the works will become too hard and brittle. The composition is useless when it has been constantly employed for about a month; the period depends, however, on the extent to which it is used, and the trough should be thoroughly cleansed out before new mixture is placed in it.

The following recipe is recommended:

Twenty gallons of spermaceti oil; twenty pounds of beef suet, rendered; one gallon of neat's foot oil; one pound of pitch; three pounds of black resin.

These last two articles must be previously melted together, and then added to the other ingredients; when the whole must be heated in a proper iron vessel, with a close cover fitted to it, until the moisture is entirely evaporated, and the composition will take fire on a flaming body being presented to its surface, but which must be instantly extinguished again by putting on the cover of the vessel.

When the saws are wanted to be rather hard, but little of the grease is burned off; when milder, a larger portion; and for a spring temper, the whole is allowed to burn away.

When the work is thick, or irregularly thick and thin, as in some springs, a second and third dose is burned off, to insure equality of temper at all parts alike.

Gun-lock springs are sometimes literally fried in oil for a considerable time over a fire in an iron tray; the thick parts are then sure to be sufficiently reduced, and the thin parts do not become the more softened from the continuance of the blazing heat.

Springs and saws appear to lose their elasticity, after hardening and tempering, from the reduction and friction they undergo in grinding and polishing. Toward the conclusion of the manufacture, the elasticity of the saw is restored, principally by hammering, and partly by heating it over a clear coke fire to a straw color; the tint is

removed by very diluted muriatic acid, after which the saws are well washed in plain water and dried.

Watch springs are hammered out of round steel wire, of suitable diameter, until they fill the gage for width, which, at the same time, insures equality of thickness; the holes are punched in their extremities, and they are trimmed on the edge with a smooth file; the springs are then tied up with a binding wire, in a loose, open coil, and heated over a charcoal fire upon a perforated revolving plate, they are hardened in oil, and blazed off.

The spring is now distended in a long metal frame, similar to that used for a saw blade, and ground and polished with emery and oil, between lead blocks; by this time its elasticity appears quite lost, and it may be bent in any direction; its elasticity is, however, entirely restored by a subsequent hammering on a very bright anvil, which "puts the nature into the spring."

The coloring is done over a flat plate of iron, or hood, under which a little spirit lamp is kept burning; the spring is continually drawn backward and forward, about two or three inches at a time, until it assumes the orange or deep blue tint throughout, according to the taste of the purchaser; by many, the coloring is considered to be a matter of ornament, and not essential. The last process is to coil the spring into the spiral form, that it may enter the barrel in which it is to be contained; this is done by a tool with a small axis and winch handle, and does not require heat.

The balance springs of marine chronometers, which are in the form of a screw, are wound into the square thread of a screw of the appropriate diameter and coarseness; the two ends of the spring are retained by side screws, and the whole is carefully enveloped in platinum foil, and tightly bound with wire. The mass is next heated in a piece of gun barrel, closed at one end, and plunged into oil, which hardens the spring almost without discoloring it, owing to the exclusion of the air by the close platinum covering, which is now removed, and the spring is let down to the blue before removal from the screwed block.

The balance or hair springs of common watches are frequently left soft; those of the best watches are hardened in the coil, upon a plain cylinder, and are then curled into the spiral form between the edge of a blunt knife and the thumb, the same as in curling up a narrow ribbon of paper, or the filaments of an ostrich feather.

UMBRELLA ODDITIES.

Of the umbrella, these are a few of the curious ideas which have been developed by men who have paid particular attention to the subject during the past century. Among the oddest of the oddities we mention, first, that of Florentine Delmas, who not many years since made a band of sponges united with cords, which he proposed to attach to umbrellas, to prevent the rain that runs down "the umbrella's oily shed" from dripping on the wearer or those persons near him. "When the sponges are filled," says Delmas, "they can be taken off and squeezed dry." It is almost unnecessary to add that Delmas did not make a success of his "absorber."

In 1787 Thomas Folgam, of London, advertised in the journals of the day that he prepared all kinds of common umbrellas in a particular way so that they would never stick together. Folgam's plan to prevent sticking, how

ever, was not evidently a success, for thirty years after, we find that Samuel Jean Pauly, tired of sticky oiled silk and glazed cotton covers, proposed to make a cover, without seams, of the "peritonal coat, membrane, or covering of the cœcum, or blind-gut of animals," preferably those of oxen. The skins were soaked in water, placed wet on a model, and joined by laying the edges of one upon another. The glutinous nature of the skins consolidated the seams. When dry, the whole was varnished.

Gutters on umbrellas for carrying off rain have been invented by several persons. A. B. Caldwell, of this city, who is not in the trade, patented this invention some years ago, but a Frenchman named Didot, patented the same in the year 1809 in France. Didot had the water collect at any convenient point in the gutter, and discharge through a conduit into a reservoir located on the stick or from a lip at the circumference. James Willis, who invented a number of improvements to umbrellas to prevent water from dripping from the forward tips upon the person carrying the umbrella, made a gutter in the forward part of the cover to divert the water laterally and cause it to fall from the side tips. This was done by jointing the rib and connecting the jointed piece to the stretcher by a rod, or by making the rib elastic and leading a cord along its length, which would bend up the end of the rib.

Manilius Kurts had an almanac attached to a spindle which was placed in the stick. The spindle was acted on by toothed wheels, so that it could be turned daily to the proper date.

It is not long since that three men, named Pond, Richardson, and Morse, exercised their genius upon the insertion of glass windows between the ribs of an umbrella, and also "platanized" one surface of the glass, so that the person carrying it could see who was approaching, and yet his own face would be out of sight.

Samuel Stocker believed in having port holes in his umbrella, so he attached a curtain to it or had the cover made long enough to form a curtain and in this curtain he had a hole to see through.

Nearly one hundred years ago, Mark Bull invented an umbrella with a ball-and-socket joint, for the use of persons riding in saddles or in carriages. He called it a machine for supporting an umbrella which may be fixed to any saddle or wheeled carriage, being far more complete than anything hitherto invented." It was undoubtedly the pioneer of those graceful attachments to wagons now known as the Phaeton and other carriage umbrellas.

Many other oddities have exercised the brains of umbrella inventors, but the above are the most curious of any which have been recorded. Hollow sticks containing perfumes, medicine bottles and watches, have been patented in America, England France; telescopes, rifles and air-guns have been inserted in sticks, and many other devices made so as to form a combination of some other useful article with that necessity and ornament — the umbrella.

SPOTS AND STAINS.

How to Remove from Cloth.

Taking out grease and other spots from clothes is an application of chemistry which has a practical interest for everybody. It demands a certain acquaintance with solvents and re-agents, even though we may not understand the laws of chemical affinity on which

the action depends. The general principle is the applying to the spot a substance which has a stronger affinity for the matter composing it than this has for cloth, and which shall render it soluble in some liquid so that it can be washed out. At the same time, it must be something that will not injure the texture of the fabric or change its color. The practical hints we shall give are condensed from a variety of foreign sources.

The best substances for removing grease or oil are: 1. Soap. 2. Chalk, fuller's earth, steatite, or "French chalk." These should be merely diffused through a little water to form a thin paste, which is spread upon the spot, allowed to dry, and then brushed out. 3. Ox-gall and yolk of egg, which have the property of dissolving fatty bodies without affecting perceptibly the texture or colors of cloth. The ox-gall should be purified, to prevent its greenish tint from degrading the brilliancy of dyed stuffs or the purity of whites. Thus prepared, it is the most effective of all substances known for removing this kind of stains, especially from woolen cloths. It is to be diffused through its own bulk of water, applied to the spots, rubbed well into them with the hands till they disappear, after which the stuff is to be washed with soft water. 4. The volatile oil of turpentine. This will take out only recent stains, for which purpose it ought to be previously purified by distillation over quicklime.

An earthy compound for removing grease spots is made as follows: Take fuller's earth, free it from all gritty matter by elutriation with water; mix with half a pound of the earth so prepared, half a pound of soda, as much soap, and eight yolks of eggs well beaten up with half a pound of purified ox-gall. The whole must be carefully triturated upon a porphry slab; the soda with the soap in the same manner as colors are ground, mixing in gradually the eggs and ox-gall previously beaten together. Incorporate next the soft earth by slow degrees, till a uniform thick paste be formed, which should be made into balls or cakes of a convenient size, and laid out to dry. A little of this detergent being scraped off with a knife, made into a paste with water and applied to the stain, will remove it.

Tar and pitch produce stains easily removed by successive applications of spirits of turpentine, coal-tar naptha and benzine. If they are very old and hard, it is well to soften them by lightly rubbing with a pledged of wool dipped in good olive oil. The softened mass will then easily yield to the action of the other solvents. Resins, varnishes and sealing-wax may be removed by warming and applying strong alcohol. Care must always be taken that, in rubbing the material to remove the stains, the friction shall be applied the way of the stuff, and not indifferently backwards and forwards.

Most fruits yield juices which, owing to the acid they contain, permanently injure the tone of the dye; but the greater part may be removed without leaving a stain, if the spot be rinsed in cold water in which a few drops of aqua ammonia have been placed, before the spot has dried. Wine stains on white materials may be removed by rinsing with cold water, applying locally a weak solution of chloride of lime, and again rinsing in an abundance of water.

Some fruit stains yield only to soaping with the hand, followed by fumigation with sulphurous acid; but the latter process is inadmissible with certain colored stuffs. If delicate colors are injured by soapy or alkaline matters,

the stains must be treated with colorless vinegar of moderate strength.

Fresh ink and the soluble salts of iron produce stains which, if allowed to dry, and especially if afterwards the material has been washed, are difficult to extract without injury to the ground. When fresh, such stains yield rapidly to a treatment with moistened cream of tartar, aided by a little friction, if the material or color is delicate. If the ground be white, oxalic acid, employed in the form of a concentrated aqueous solution, will effectually remove fresh iron stains. Acids produce red or other stains on the vegetable colors, except indigo. If the acid has not been strong enough to destroy the material, and the stains are fresh, the color may generally be restored by repeated soakings in dilute liquor ammonia, applied as locally as possible. Photographers frequently stain their clothes with nitrate of silver. The immediate and repeated application of a very weak solution of cyanide of potassium (accompanied by thorough rinsings in clean water) will generally remove these without injury to the colors. —*Boston Journal of Chemistry.*

MANUFACTURE OF RUSSIAN SHEET IRON.

Herbert Barry, Esq., late director of estates and ironworks of Vuicksa, thus describes the manufacture of sheet-iron in Russia:

"The refined iron is hammered under the tilt hammer into narrow slabs, calculated to produce a sheet of finished iron two archimes by one (fifty-six inches by twenty-eight inches), weighing when finished from six to twelve pounds. These slabs are called *balvanky*. They are put in the re-heating furnaces, heated to a red heat, and rolled down in three operations to something like a sheet, the rolls being screwed tighter as the surface gets thinner. This must be subsequently hammered to reduce its thickness and to receive the *glance*. A number of these sheets having been again heated to a red heat, have charcoal, pounded to as impalpable a powder as possible, shaken between them through the bottom of a linen bag. The pile, then receiving covering and a bottom in shape of a sheet of thicker iron, is placed under a heavy hammer; the bundle, grasped with tongs by two men, is poked backwards and forwards by the gang, so that every part may be well hammered. So soon as the redness goes off they are finished, so far as this part of the operation goes. So far they have received some of the *glance*, or necessary polish; they are again heated, and treated differently in this respect, that instead of having powdered charcoal strewed between them, each two red hot sheets have a cold finished sheet put between them; they are again hammered, and after this process are finished as far as thickness and *glance* goes:

"Thrown down separately to cool, they are taken to the shears, placed on a frame of the regulation size, and trimmed. Each sheet is then weighed, and after being thus assorted in weights, are finally sorted into first, second, and thirds, according to their *glance* and freedom from flaws and spots. A first class sheet must be like a mirror, without a spot in it.

"One hundred poods of *balvanky* make seventy lbs. of finished sheets; but this allowance for waste is far too large, and might easily be reduced. Four heats are required to finish.

"The general weight per sheet is from six to twelve lbs., the larger

demand being from ten to eleven lbs.; but they are made weighing as much as thirty lbs., and may then almost be called thin boiler plates, being used for stoves, etc. Besides the finished sheets, a quantity of what are called *red sheets* are made, which are not polished, and do not undergo the last operation.

"Taking the Michælofskoi Works, which are the largest sheet-iron ones in the Empire, I found that the power running the sheet rolls was equivalent to forty horses, the rolls making seventy to eighty revolutions a minute. The hammers used are powerful, having the surface of the stroke very large—just the contrary shape there to is the ordinary tilt-hammer. A gang turns out in a shift from 450 to 500 sheets.

"In the central works, where they make sheet iron from puddled iron, they *roll* it into the necessary size, and then roll this *balvanky* into half ready sheets with the same sort of rolls as are used in the North, but which however run much slower; the finish being given also by hammers in the same manner, but leaving out the final part of the operation of placing cold finished sheets between the hot unfinished ones. The hammers are not so heavy, and the heating furnaces are not so well constructed and do not regulate the flame as well. The trimming, sorting, etc., are carried out in just the same way.

"The waste is really greater in the Central Works than it *should* be in the North, as the hammered iron does not leave such a raw edge as the puddled.

"A fact that proves the superior manufacture of the North over the other parts of the empire is, that whereas in the former sheet iron is the best-paying, in the latter it is the worst business. . . .

"For the uses to which sheet iron is put ductibility is of the first consequence, and no sheet iron is of passable quality that will not bend four times without breaking; some made in the Oural I have bent as many as nine times without showing the break. Coupled with this quality the *glance* must be taken into consideration, as good polished iron will not take so much paint as the inferior polished."

HOW FISH-HOOKS ARE MADE.

The wire for making fish-hooks is procured in coils from Sheffield or Birmingham of different qualities varying with the kinds of goods required. All first-class hooks are made from the very best cast steel wire; other qualities are made of steel but inferior, while the common sorts of large hooks are made of iron. Cutting the wire into lengths suitable for the hook about to be made is the first operation and is performed in two ways. The small and medium sizes are cut from the bundle or coil in quantities between the blades of a pair of large, upright shears in the same manner as needle wires; but large sea hooks made from thick wire are cut singly, each length being placed separately upon a chisel fixed in a block or bench and struck with a hammer. What are called "dubbed" hooks, are "rubbed" after being cut—that is, placed in a couple of iron rings, then made red hot and rubbed backward and forward with an iron bar, until the friction has made every wire straight. Hooks in general are not rubbed but are at once taken to be "bearded" or barbed, which is thus performed. The bearder, sitting at a work-bench in a good light, takes up three or four wires with his left hand between the finger and thumb and places the ends upon a piece of iron somewhat like a very small anvil fixed

in a bench before him. In his right hand he holds the long handle of a knife of peculiar shape, the blade of which, having the edges turned from him is placed flat upon the wires the knife point at the same time being passed under a bent piece of iron firmly fixed, which enables him to obtain sufficient leverage to cut the soft wires, and raise the barb or "beard," this being done by pushing the handle forward while the point remains fixed as described. It becomes a laborious operation in the case of very large sizes, requiring not merely a forward motion of the arm but a strong push with the body against the handle. They are next taken by the filer who makes the points. Each barbed wire is taken up, separately fixed in small pliers held by the left hand, then placed upon the end of a slip of box-wood and filed to the degree of sharpness required. This is a matter of great nicety and delicacy. Common hooks are pointed with one file, but the finer sorts require two or three, flat and half round. Large sea hooks have the ends flattened and the burr cut off on each side with a sharp chisel into a roughly-shaped point, previous to being filed. The points of "dubbed" hooks are not filed but ground upon a revolving stone and this process is called "dubbing." When the points are made the benders proceed to operate upon them. A woman holds in her left hand a piece of wood at the upper end of which is inserted a curve or "bend" of steel projecting slightly. Taking a wire in her right hand she catches the beard upon one end of the steel curve and pulls the wire round into the proper "hook" shape. For the large sizes the "bends" are fixed, not held by the hand. Nothing now is necessary to perfect the formation but "shanking" which is done in various ways. Hooks are flattened at the shank end by a workman who holds the curved part in his left hand, rests the end upon the edge of a steel anvil and strikes it one sharp blow with a hammer. Some are tapered at the end with a file while others are simply curled round or "bowed" to provide a fastening for the line. With steel hooks, hardening is the next process; but iron ones require converting or "pieing" before they will harden. The pie hole is a recess with a large open chimney and in this recess is placed an iron pot filled with alternate layers of hooks and bone dust. A little distance from the pot, bricks are built up all round and the space filled with coal which, when lighted, creates an intense heat and to its action the hooks are exposed for about ten or twelve hours, allowed afterward to cool, and are then fit for hardening. To effect this, they are exposed to a great heat upon pans in a fire hole and while red hot, poured into a cauldron of oil. Small hooks are afterward tempered in a kind of frying pan partly filled with drift sand and placed over a fire. The larger ones are tempered in a closed oven at a low heat. When these operations are completed they are taken to the scouring mill. It is occupied by a number of revolving barrels driven by steam power and containing water and soft soap into which the hooks are put and allowed to remain for two or three days. At the end of that time the friction having worn them all bright, they are taken out and dried in another revolving barrel containing saw dust. Blueing, japanning, or tinning follows —of which the two latter are performed in the ordinary way and the blueing is done by exposing them to a certain degree of heat in drift sand

over a fire in the same way as small hooks are tempered. Counting, papering, labelling and packing, complete the series and the goods are then ready for the market.

BUSHEL WEIGHTS OF DIFFERENT STATES.

ARTICLES.	NEW YORK.	N. JERSEY.	PENN.	OHIO.	INDIANA.	ILLINOIS.	MICHIGAN.	WISCONSIN.	IOWA.	MISSOURI.
Wheat	60	60	60	60	60	60	60	60	60	60
Corn, Shelled	56	56	56	56	56	56	56	56	56	52
Corn, on ear	70	70	70	70	68	70	70	70	70	70
Oats	32	30	32	32	32	32	32	32	33	35
Barley	48	48	47	47	48	44	44	48	48	48
Rye	56	56	56	56	56	56	56	56	56	56
Buckwheat	48	50	48	..	50	40	42	42	52	..
White Beans	62	60	60	56	60	60	60	60	60	60
Castor Beans	46	46	46	46	46	46	..	..	..	46
Irish Potatoes	60	60	60	60	60	60	60	60	60	60
Sweet Potatoes	55	55	55	55	55	55	55	55	55	55
Turnips	55	55	55	55	55	55	55	55	55	55
Onions	57	57	57	57	57	57	57	57	57	57
Top Onions	28	28	28	28	28	28	28	28	28	28
Peas	60	60	60	60	60	60	60	60	60	60
Dried Peaches	32	33	33	33	..	..	28	28	33	33
Dried Apples	22	22	22	25	25	24	28	28	24	24
Bran	20	20	20	20	20	20	20	20	20	..
Malt	38	38	38	38	38	38	38	38	38	38
Hemp Seed	44	44	44	44	44	44	44	44	44	44
Flax Seed	55	55	56	56	56	56	56	56	56	56
Unslacked Lime	70	80	80	80	80	80	80	80	80	80
Coarse Salt	56	50	85	50	50	50	50	50	50	50
Fine Salt	55	50	62	50	50	50	50	50	50	50
Plastering Hair	8	8	8	8	8	8	8	8	8	8

HISTORY OF FORKS.

According to Professor Beckman, they were probably first used by the Italians about the end of the fifteenth century. They were unknown to the ancients, none being met with among the furniture of Herculaneum and Pompeii; and the Chinese, to this day, use two small sticks, like a cedar pencil, called *chop sticks*, for picking up the morsels of meat from the plate. Before the use of forks in Europe the fingers were often made to perform the service now rendered by them so much more readily, as well as decorously. The use of forks was, at first, considered by many an unnecessary luxury, and as such they were forbidden in certain convents. At first they had only two prongs of iron, but now have frequently three, and in a certain kind derived from the French, called *spoon forks*, they have four or five prongs, and these are always of silver. The first necessity for the use of a fork would probably be felt by the carver, and the oldest carving fork known, belonging to Henry IV. of France, is still preserved in the castle of Pau. It is of steel, has two prongs, and is of length sufficient to secure a baron of beef.

The earliest distinct mention of the established use of forks occurs in a curious passage of Coryates' "Crudities," a singular book of travels published in 1611. The author says, "I observed a custom in all these Italian cities and towns through which I passed that is not used in any other country that I saw in my travels. The Italians and also most strangers that are cormorant in Italy, do always, at their meals, use a little fork when they cut their meat. For while, with their knife, which they hold in one hand, they cut the meat out of the dish, they fasten their forks, which they hold in the other hand, upon the same dish; so that whosoever he be, that sitting in the company of any others at meals should unadvisedly touch the dish of meat with his fingers, from which all the table do cut, he will give occasion of offense unto the company, inasmuch as that for his error he shall be at least brow-beaten, if not reprehended in words. This form of feeding, I understand, is generally used in places of Italy, their forks being, for the most part, made of iron or steel, and some of silver, but those are only used by gentlemen. The reason of this curiosity is, because the Italian cannot by any means endure to have his dish touched with fingers, seeing all men's fingers are not alike clean. Hereupon

I myself thought good to imitate the Italian fashion by the forked cutting of meat; not only while I was in Italy, but also in Germany, and oftentimes in England since I came home; being once quipped for the frequent using of my fork by a certain gentleman, a familiar friend of mine, one Mr. Lawrence Whitaker, who in his merry humor doubted not to call me at table *furcifer,* only for using a fork at feeding, but for no other cause." It would seem from the foregoing passage, that for each guest to put his fingers into the dish was no "curiosity" in England 250 years ago, any more than it is at present in Turkey and all parts of the East. We read still in the accounts by travelers of Arabian manners, of the host expressing his attention to his guests by helping them, with his fingers, to choice morsels of meat, even from his own plate.

HISTORY OF KNIVES.

The history of knives alone would furnish matter for an interesting essay. Selected splinters of flint, and particularly of Obsidian, have sharp edges; and, when fixed in handles, make cutting instruments much better than might be supposed by those who have not seen them; they are,however,very far inferior to those of iron in point of strength and durability, being extremely brittle and incapable of being sharpened—for it is only the natural thin edges of the splinter that will serve to cut. These were the sole cutting instruments in possession of the inhabitants of the numerous islands in the Pacific Ocean previous to their discovery; and from the remains of spearheads, called *Celts*, made of flint, dug up in Britain, the aborigines, whoever they were, had not, in all probability, the use of iron.

Iron, although the best material fitted for the purpose of making edge tools, and now the cheapest and most abundant of the metals, was not the first employed. It is never found in the earth in its metallic state, like some other metals, as gold, silver and copper, and the art of extracting it from its ores is one that supposes a considerable advance in civilization. Copper, hardened by tin, and various other kinds of brass and bronze, appear to have been the materials of which all the warlike weapons and instruments for domestic purposes among the most ancient Greeks were formed. In the description of the Trojan war by Homer, no mention is made of iron or steel; but the swords, javelins and armour were of brass; and it has hence been doubted whether iron was known in Greece at that period. We find, however, that the Romans were, from the first, not only possessed of iron, but that they at an early time made knives of that metal for carving their meat, and among them the office of domestic carver existed in great families as in later times.

Among modern nations, England seems to have been pre-eminent in the manufacture of knives, and although previously to the reign of Elizabeth many were imported, yet then London was the place where the best cutlery was made, although some other towns, as Sheffield, Woodstock and Salisbury, were its rivals. The most ancient kind of knives were of the sort called *case knives,* having the blade stuck in the handle like desk penknivcs, and which require to be kept in a sheath. Coarse knives of this kind, termed *whittles,* were manufactured at Sheffield in 1575, and were sold at the low price of one penny; and at this time and earlier, that town was celebrated for its cut-

lery. At what date the simple and effective contrivance was invented by which knives are made to shut, as clasp knives and common penknives, does not appear; but they are mentioned in 1650, as having handles of iron covered with horn, tortoise-shell, etc.

CORK CUTTING IN SPAIN.

The recent political revolution in Spain, involving the voluntary abdication of the throne by the late King Amadeus, and the almost unanimous adoption by the Cortes of a Republican form of government, imparts a new interest, for Americans at least, in the industrial resources of that wonderful country. Not least among these resources is the production of cork.

The cork tree is found in its wild state in the south of Portugal, Africa and Spain. In the latter country the preparation of the bark for foreign markets is one of the staple industries, furnishing labor and subsistence to a large proportion of the population.

The tree is a peculiar kind of oak, and the cork is the soft cellular interior bark, lying just inside the exterior woody covering. It is removed by making several longitudinal clefts up and down the trunk, and then girdling the latter with horizontal incisions. This operation is not performed, however, until the tree has attained a certain age, generally fifteen years, and the first crop is employed only for inferior purposes. Seven years afterwards the tree will have another coating of bark, which is stripped and used for making corks, and so on every five to seven years, according to the quality of the ground. The tree does not suffer from the process of scraping, as it generally lives from one to two hundred years.

Between the cork and the tree there is another bark that is used for tanning; but this is only removed when the tree is cut down. It is a curious fact that if any portion of this inner coating be destroyed, further formation of the cork on the injured spot ceases. After the layers of the cork are stripped, they are inspected and assorted, according to their sizes and quality, those of the finest texture being of the greatest value. The inferior portions are generally sorted out, their crust burnt off and sold mostly for floats, thus receiving the name of fishing cork. The better qualities are first boiled and scraped, and then blackened over a coal fire, the object being to make the surface smooth, and at the same time to conceal flaws. Some varieties, generally the best, are faced in order to exhibit the fineness of their texture.

After being forwarded to the warehouses, the largest slabs are cut into pieces of about three and a half feet in length, eighteen inches in width and ranging from one half inch to three inches in thickness. Drying and packing in bales weighing one hundred and fifty pounds each follows, and the cork is ready for exportation.

From five to twenty-five cents per pound is the usual price paid by the cork cutter in this country for the rough material as it arrives in the bale. It then undergoes another assorting, and a thorough steaming, in a chest designed for the purpose, the latter process softening the cork and rendering it easy to cut. To divide the substance special machinery is employed. Rapidly revolving circular knives are used, which cut by a drawing motion, as crushing strokes simply break the cork or cause it to crumble. The workman sitting in front of the machine places a piece of cork of suita-

ble size in a revolving spindle by which it is firmly held. This spindle is raised a measured distance and the edges of the cork come in contact with the rotating knife, which smoothes them off and leaves its work in a perfectly cylindrical form. Another method is to place the rough bits of cork in grooves on the circumference of a wheel which, working automatically, carries each piece to a point where its ends are received by a small lathe. The cork is then revolved slowly while a large circular knife removes a thin shaving, thus giving it the necessary taper, and a surface as true and smooth as if sandpapered. As fast as a cork is finished by the automatic lathe, it is released and another substituted in its place.

Every portion of the material is utilized, either as stuffing for cushions or life preservers, or as a non-conducting substance for placing between walls or floors of buildings to deaden sound.

It has been estimated that it would require 4,000 men to be continually at work to supply New York alone with corks, if all had to be made by hand. There are at present 60 manufactories in the United States, cutting and supplying corks to the value of $2,250,000 per year.

THE GUAVA.

The guava is a tree which grows in tropical countries, and it is found principally in the West Indies. It is of the genus termed by botanists, Psidium, and is of two sorts, the P. pomiferum and P. peryferum. The plant does not attain any considerable size, being generally about fifteen feet high; and it is of very delicate formation. The bark is quite thin, and of a light brown color. It peels off in small portions when exposed to the sun; to prevent this, the trees are usually planted beneath others of a larger growth and hardier nature. The leaves are of an elliptic, lanceolate form. They are very distinctly marked by the fibers of which they are composed. They are of a dark green color, and measure about 2½ inches. The flowers resemble those of the orange, and emit a strong perfume. The fruit is about the size of a small lemon. It is almost of the same shape and color. The interior consists of a red, pulpy substance, containing an innumerable quantity of small seeds somewhat larger than those of the fig. The rind of the fruit is of the consistency of that of an apple. Of this fruit the West Indians make several kinds of preserves, the guava jelly, stewed guava, quake pear, and marmalade. The most lucrative is the guava jelly. The fruit is often eaten in its raw condition. The negroes are so fond of it that they are very wary and diligent in guarding the trees from robbery when they are bearing fruit.

The guava jelly is obtained by boiling the guavas with sugar and spices; and, after expressing the juice through a cloth, it is left to cool.

The jelly is frequently bottled, but oftener it is put into small cylindrical boxes made of laminated pine board. A great quantity of this comfit is manufactured in Cuba, where it is termed "Jalea de guayaba," which is exported to the United States and Europe. Notwithstanding that a good deal is made in the smaller islands, they import quite a quantity of the Cuban jelly.

After the juice has been expressed from the guava, there remain the skins and the pulp containing the seeds; the latter is stewed and bottled, and it con-

stitutes the stewed guava. This is generally partaken of with milk.

The skins are converted into the delicacy termed "quake pear," by a process varying slightly from the foregoing.

The guava marmalade is not frequently made. It consists of the guava grated and prepared in a peculiar manner.

Of the forementioned preserves, the marmalade is preferred by most connoisseurs. The small seeds in the stewed guava are very objectionable, the more so if one is subject to toothache, as they get into the cavities of decayed teeth, causing a great deal of suffering.

The natives of the West Indies are great herbalists; they convert almost any plant into medicine of some kind or other, and they have discovered several medicinal properties in the guava tree.

There is no distinction made between the name of the tree and that of the fruit in English, both being guava; the French term the tree, *goyavier*, and the fruit, *goyave*. Their respective terms in the Creole patois are, *gyan-baum*, and *gyan*.

INTEREST.

The following rules are so simple and so true, according to all business usages, that every banker, broker, merchant or clerk should post them up for reference. There being no such thing as a fraction in it, there is scarcely any liability to error or mistake. By no other arithmetical processes can the desired information be obtained by so few figures:

SIX PER CENT.—Multiply any given number of days of interest desired by the principal; separate the right hand figure and divide by six; the result is the true interest, in cents, on such sum for such number of days at six per cent.

EIGHT PER CENT.—Multiply any given amount for the number of days upon which it is desired to ascertain the interest, and divide by forty-five, and the result will be the interest on such sum for the time required, at eight per cent.

TEN PER CENT.—Multiply the same as above and divide by thirty-six, and the result will be the amount of interest on such sum for the time required, at ten per cent.

ANCIENT MODES OF EXTINGUISHING FIRES.

Fire, which was anciently considered the most mysterious and terrible of the four "elements," and for that reason was the invariable accompaniment of the process of sorcery, divination and magic, modern chemistry has shown to be no element at all, but simply the visible effect of rapid combustion; thus, indeed, it has lost its suppositious mystery, although its real capacity of producing terror must ever remain. There is hardly a scene which the mind can present to itself more heart-rending than that of a great conflagration—a city in flames and its inhabitants driven houseless and homeless into the bleak and icy air of winter; and this, too, by the very agent which they had used to further their comfort. Like all things, enough of which is good, but of which too much is disastrous, fire is a "good servant but a bad master."

We moderns, who have the telegraph to let us know in a moment in what part of the city there is a fire, and steam fire engines to appear at the

scene of conflagration with a celerity which, a few years ago, was unknown even to us, can hardly conceive the terror which the outburst of a fire in a great city of antiquity caused in the minds of its inhabitants; especially frightful must such calamity have been in time of war, when, to be driven from a beleaguered city was to be driven into the midst of cruel and implacable enemies, and it is well known that fire was one of the most common and destructive means employed in ancient warfare.

Antiquity, being thus put at its wit's end, devised means of extinguishing fires which must seem to us extremely ludicrous. The first hose used was probably the gut of an ox, having at one extremity a bag filled with water, upon being compressed would eject the fluid in a stream; but such a contrivance would be of but little value when a city was on fire. At best it could send a stream but a short distance and the bag would need to be detached from the hose and replenished very frequently. The houses were not seldom quite lofty, and, altogether, this primitive hose must have been very unserviceable.

Buckets and syringes were used, as were also pumps, and doubtless other machinery of which history makes but little mention. At Rome there were professional firemen trained to their duties from youth, and known as *matricularii*. They appear to have been a boisterous set of men, not altogether unlike those who, a few years ago, were led to fights and fires in New York by the celebrated "Mose." The Emperor Trajan, writing to Pliny the Younger, who was Governor of Bitynia, and had asked instructions from headquarters in regard to raising a company of professional "fire laddies," said that they were not the most peaceable citizens possible, and that they would not fail to form themselves into factious assemblies" on the slightest provocation. Just think for a moment what must have been the result of the meeting of the rival companies of *matricularii!* We all know what good service was done by "Mose" upon the devoted head of "Syksey" when the speaking trumpet was the weapon of offense—but how ridiculous as well as bloody must have been the fights of firemen in the narrow streets of Rome, when buckets, syringes, long poles with sponges attached to them, and stones, were the munitions of war. A party running down to the "yellow Tiber" to get water for the syringes, meet another party just returning with buckets which they have filled with the precious fluid, intending it to be used by the mop-carriers. Instantly there occurs a row, upon the issue of which depends the possession of the buckets; the moppers and the bucketers run from all quarters to mingle in the affray, and, by the time that forty or fifty ringleaders have bitten the dust, the water is all spilled and the *casus belli* removed with a vengeance. In the meantime the conflagration is spreading, and it is lucky for Rome if, before long, a whole quarter be not burned down. That this is not merely a fancy sketch, may be seen from the accounts which have come down to us, showing that the rabble of Rome was the most quarrelsome and seditious of any in the ancient world, with, perhaps, the single exception of the rabble of Alexandria. Also may it be seen from the fact that the firemen were pointed out as being especially fiery and riotous.

The houses of Rome were very high, and almost always their upper stories

were made of wood; this, added to the fact that the streets were generally narrow, will show how easy it must have been for conflagrations to spread. The city suffered terribly from fire many times, and several times was almost entirely consumed. Every precaution was taken, such as compelling persons to build their houses a certain distance from each other, instituting bodies of public and private watchmen, and the like, and these means, when faithfully and dilligently used, were no mean preventives; but what was really needed was engines more nearly approaching to perfection, both in construction and handiness; and we find that the law at one time required every citizen to keep a private engine or *sipho* in his house.

With such inefficient apparatus was Rome guarded from fire.

In the dark ages conflagrations were common and disastrous throughout Europe, and the use of even the old engines seems to have been forgotten, certainly they were hardly used; and this fact may, among other things, be attributed to a superstition, by no means uncommon, that fires, plagues, and great calamities were visitations of Providence, and that it was impious to attempt to prevent them or to obtain mastery over them when they actually existed. The helplessness and ignorance of superstitious people are perhaps nowhere more clearly seen than in the fact that in medieval times it was believed that the most efficacious means against fire was the ringing of sacred bells and the exorcism of demons, who were apparently supposed to be very inflammable personages; and certainly, if we consider the temperature of the place whence they were supposed to come, the opinion would not seem to be altogether unfounded.

Syringes were in use in London till far into the seventeenth century. They were of brass, and the largest of them held no more than a gallon. Three men were required to work one of them—two to hold the instrument and one to work the piston. We, at this age of the world, sometimes have extensive fires, notwithstanding our improved methods of extinguishing them; but to see how unmanageable such calamities must have been two centuries ago—as at the great fire of 1666, when London was destroyed—it is only necessary to observe that, supposing one of the syringes then in use could be filled and discharged four times in a minute, four gallons only could be applied in that time by one instrument. A steam fire engine can throw twelve hundred gallons per minute a distance of two hundred and ten feet. Even supposing—a supposition manifestly absurd—that the syringe could throw water the same distance, it would require nine hundred men to do the work now done by one or two. All things being considered, fifty thousand syringes would not be as serviceable as one steam fire engine. As Ewbank says, "the whole act of using them appears rather as a farce or the gambols of overgrown boys at play than the well directed energies of men to subdue the raging element."

In the sixteenth century syringes were made which differed from those previously in use only in being larger and being placed on wheels. A picture of one of these is preserved in Besson's "Theatre," and looks, for all the world, like an immense sausage stuffer, capable of holding about a barrel of water. It had no hose (the ox's gut contrivance had been lost during the middle ages), and consequently the direction of the stream of water could not readily be

changed, had the contrivance been placed simply on wheels. To avoid this difficulty, the syringe swung on pivots, and thus could be elevated or depressed, but when motion from side to side was required, the whole machine had to be turned.

It has already been said that pumps were used in very ancient times; but these, too, were lost in the darkness of the Middle Ages, to appear again in Germany near the close of the sixteenth century. A picture of the pump for extinguishing fire, given by Decaus, shows that it was worked by four men, two of whom pumped, while one held the "squirt," and another turned pailfuls of water into the machine. If a covered washtub be put on a sled, a board nailed to one side and rising two or three feet higher than it, and the whole thing considered a churn, the top of whose handle is inserted in a lever, one end of which is inserted in the board and the other end worked by hand, a very good idea of this pump will be obtained. The whole contrivance has a single forcing pump secured in a tub; afterwards, as in Hautsch's engine—a very efficient one—two pumps were employed, but it was not till some years later, that the air chamber and hose came into use; and thenceforth, until the invention of steam fire engines, variations in structure were simply those of detail in convenience of carriage and working.

THE HISTORY OF CHURCH PEWS.

In the early days of the Anglo-Saxon and some of the Norman churches, a stone bench running around the interior of the church, except the east side, was the only sitting accommodation for its members and visitors. In 1319, the people are represented as sitting on the ground or standing. A little later the people introduced low, three-legged stools promiscuously over the church. Soon after the Norman conquest, wooden seats were introduced. In 1387 a decree was issued in regard to the wrangling for seats, so common, that none should call any seat in church his own except noblemen and patrons, each entering and holding the one he first found. From 1530 to 1540 seats were more appropriated, a cross-bar guarded the entrance, bearing the initial letters of the owner. In 1608 galleries were introduced. And as early as 1614 pews were arranged to afford comfort by being baized or cushioned, while the sides around were so high as to hide the occupant—a device of the Puritans to avoid being seen by the officers, who reported those who did not stand when the name of Jesus was mentioned.

ANCIENT INKS.

The ink used by ancient writers was formed of lampblack, or the black taken from burnt ivory, and soot from furnaces and baths. Some have supposed that the black liquor which the cuttle-fish yields was frequently employed. One thing is certain, that whatever were the component ingredients, from the blackness and solidity in the most ancient manuscripts, from an ink-stand found at Herculaneum, in which the ink appears as a thick oil, and from chemical analysis, the ink of antiquity was much more opaque, as well as encaustic, than that which is used in modern times. Inks of different colors were much in vogue; red, purple, blue, and gold and silver inks, were the principal varieties. The red

was made from vermilion, cinnabar, and carmine, the purple from the murex; one kind of which, called the purple encaustic, was appropriated to the exclusive use of the emperors. Golden ink was much more popular among the Greeks than among the Romans. During the middle or dark ages, the manufacture both of it and of silver ink was an extensive and lucrative branch of trade, and the illuminated manuscripts which remain are a striking proof of the high degree of perfection to which the art was carried. The making of the inks themselves was a distinct business; another connected with it, and to which it owed its origin, was that of inscribing the titles, capitals, as well as emphatic words, in colored and gold and silver inks.

COLORING GRASSES.

There are few prettier ornaments, and none more economical and lasting, than bouquets of native grasses, mingled with the various Gnaphalium, or unchangeable flowers. They have but one fault; and that is the want of other colors besides yellow and drab, or brown. To vary their shade, artificially, these flowers are sometimes dyed green. This, however, is in bad taste, and unnatural. The best effect is produced by blending red and rose tints, together with a very little pale blue, with the grasses and flowers, as they dry naturally. The best way of dying dried leaves, flowers and grasses, is simply to dip them into the spirituous liquid solution of the various compounds of aniline. Some of these have a beautiful rose shade; others red, blue, orange and purple. The depth of color can be regulated by diluting, if necessary, the original dyes with methyl or spirit, down to the shade desired. When taken out of the dye they should be exposed to the air to dry off the spirit. They then require arranging, or settling into form, as when wet the petals and fine filaments have a tendency to cling together, which should not be. A pink saucer, as sold by most druggists, at sixpence each, will supply enough rose dye for two ordinary bouquets. The druggists also supply the simple dyes of aniline of various colors, at the same cost. The pink saucer yields the best rose dye. By washing it off with water and lemon juice, the aniline dyes yield the best violet, mauve, and purple colors.

POSTAGE-STAMP COLLECTING.

The collecting of postage-stamps is not always such a frivolous pastime or occupation as many people imagine.

These little bits of colored paper, ornamented with portraits, or coats-of-arms, or peculiar devices, have a great deal of information in them. They tell of the rise and fall of princes; of the history of the republics; of the manners and customs of the people; of the peculiar characteristics of the country. The French and Spanish stamps are epitomes of the histories of their respective countries; the English colonial stamps are a geography in themselves; and South American stamps present a fine display of mottoes and devices; from the West Indian stamps we learn something of the peculiar characteristics of these islands; while in the stamps of our own country, in common with others issuing from other quarters of the globe, we have national portrait galleries.

While postage-stamps are being collected, or when they are put into their

albums, they are examined and studied. The map is consulted to find the location of the country issuing them. The history is opened to find whose portraits are figured on them. The cyclopedia is brought out to get some idea of their value. Some learned friend is questioned to find the meaning of the peculiar inscriptions and legends. And little by little, this research goes on until the collector often finds himself, in a manner, getting hints of almost everything of interest going on in the world. If Russia and Turkey are quarreling over Montenegro, he can discuss the cause of the troubles. He found it out when examining the Montenegrin stamps in his album. When a young boy is placed on the throne of Spain, and the collector's attention is called to this country, stamps show him the many changes in that unfortunate country; and Amadeus, and Don Carlos, and Isabella and the proud and haughty nation which unveiled a new continent, pass before him as a panorama. The centennial is spoken of; our young collector takes out his album and sees Franklin with his kite, Washington at Yorktown, Perry on the Lakes, Jefferson and Louisiana, Jackson behind the cotton bales at New Orleans, Scott on the plains of Mexico, and Lincoln with his emancipation proclamation.

In stamp collecting, the judgment is sharpened in endeavoring to detect the good stamps and to discard the counterfeit; the eye is drilled to appreciate the harmony and contrast of colors, in the proper arrangement of the stamps; patience is acquired and taste cultivated in the efforts to produce fine effects; and cases are known of foreign languages being studied, simply to enable the collector to decipher the legends and inscriptions on the stamps. A pursuit which is productive of so much good should not be decried as a mere childish pastime.

The introduction of the postal system as it at present exists in all countries on the globe, has been credited to England, when, in 1840, covers and envelopes were devised to carry letters all over the kingdom at one penny the single rate. This plan was adopted through the exertions of Sir Rowland Hill, who has been aptly termed the "father of postage stamps." It now appears, however, that there is another aspirant for the introduction of the stamp system. In Italy, as far back as 1818, letter sheets were prepared, duly stamped in the left lower corner, while letters were delivered by specially appointed carriers on the prepayment of the money which the stamp represented. The early stamp represented a courier on horseback, and was of three values. It was discontinued in 1836. Whether Italy or Great Britain first introduced postage-stamps, other countries afterwards began to avail themselves of this method for the prepayment of letters, although they did not move very promptly in the matter.

Great Britain enjoyed the monopoly of stamps for three years, and, though the first stamps were issued in 1840, she has made fewer changes in her stamps than any other country, and has suffered no change at all in the main design — the portrait of Queen Victoria. In other countries, notably in our own, the Sandwich Islands, and the Argentine Republic, the honor of portraiture on the stamps is usually distributed among various high public officers; but in Great Britain the Queen alone figures on her stamps, and not even the changes that thirty-five years have made in her face are shown on the national and colonial postage stamps.

The next country to follow the example of England was Brazil. In 1842 a series of three stamps was issued, consisting simply of large numerals denoting the value, and all printed in black. Then came the cantons in Switzerland and Finland, with envelopes which to-day are very rare, and soon after them, Bavaria, Belgium, France, Hanover, New South Wales, Tuscany, Austria, British Guinea, Prussia, Saxony, Schleswig Holstein, Spain, Denmark, Italy, Oldenburg, Trinidad, Wurtemburg, and the United States. Other countries followed in the train, until, at the present moment, there is scarcely any portion of the globe, inhabited by civilized people, which has not postage stamps.

THE ORIGIN AND USES OF BRASS.

Brass, though very ancient, is not an original metal. It is an alloy; two parts copper and one part zinc. By changing these proportions, or by adding lead, tin, or antimony, the color and qualities are changed to suit different tastes or to make the shade more harmonious with its various surroundings. Brass was common in Egypt long anterior to the exodus of Israel; for, during that nation's journey to Canaan, the Israelitish women contributed their brass mirrors, which they brought with them out of Egypt, when brass was needed to make the Brazen Laver. The fact that the Egyptians were able to burnish brass so highly as to give a perfect reflection of the "human face divine," would indicate not only great skill but a large experience in its manufacture and use. Five hundred years after this period, Hiram, of Tyre, cast two pillars of brass—Jachin and Boaz—for the portico of Solomon's temple. These were more than thirty-five feet high, and some five or six feet in diameter. So valuable was the brass, of which these pillars were composed, considered, even by the Babylonians, when the pillars were near 500 years old, that, after the destruction of the temple by Nebuchadnezzar, his soldiers broke them up and carried the material to Babylon to increase the riches of that great city. Among both the ancients and the moderns brass has always ranked high among the useful and the ornamental metals. As early as 1750, mills and machinery for rolling and slitting iron were in operation in the United States. The first of which we have any record, were put up in Middleboro', Hanover, and Milton, Massachusetts. But not until 1802 was such machinery called into requisition to roll brass, and more readily to make it useful. At that time Abel Porter & Co. started a brass button manufactory in Waterbury, Conn. This firm had their brass ingots partially rolled in an iron rolling mill, and then completed the process by means of small rolls, driven by horse-power, in their own mill.

ENGLISH IVY.

The use of English ivies for the purpose of decorating living-rooms is more extensive every year, and cannot be too highly commended. Being very strong, they will live through any treatment; study their peculiarities, and manifest willingness to gratify them, and they will grow without stint. Most houses are too hot for them, as indeed they are for their owners. Neither plants nor people should have the temperature over sixty-five degrees Fahrenheit. Take care not to enfeeble your ivies by excessive watering or undue heat, and you will see they will not seem to mind

whether the sun shines on them or not, or in what position or direction you train them. Indeed, so much will they do themselves to make a room charming, that we would rather have an unlimited number of them to draw upon than anything else in nature or art.

The English ivy, growing over the walls of a building, instead of promoting dampness, as many persons would suppose, is said to be a remedy for it; and it is mentioned as a fact that in a room where damp had prevailed for a length of time, the affected parts inside had become dry when the ivy had grown up to cover the opposite exterior side. The close, overhanging pendent leaves prevent the rain or moisture from penetrating the wall. Beauty and utility in this case go hand in hand.

SKELETONIZING LEAVES.

The solution for destroying the soft tissues is made by first dissolving 4 oz. of common washing soda in a quart of boiling water; then add 2 oz. of slaked quicklime, and boil for about fifteen minutes. Allow this solution to cool; afterwards pour off all the clear liquid into a saucepan. When the solution is at the boiling point, place the leaves carefully in the pan, and boil the whole together for an hour. Boiling water ought to be added occasionally, but sufficient only to replace that lost by evaporation. The epidermis and parenchyma of some leaves will more readily separate than in others. A good test is to try the leaves after they have been gently simmering (boiling) for about an hour, and if the cellular matter does not easily rub off betwixt the finger and thumb beneath cold water, boil them again for a short time. When the fleshy matter is found to be sufficiently softened, rub them saparately, but very gently, beneath cold water, until the perfect skeleton is exposed.

The skeletons at first are a dirty white color; to make them pure white, and therefore more beautiful, all that is necessary is to bleach them in a weak solution of chloride of lime. The best solution is a large tablespoonful of chloride of lime to a quart of water; if a few drops of vinegar are added to the bleaching solution, it is all the better, for then the free chloride is liberated. Do not allow them to remain too long in the bleaching liquor, or they will become very brittle, and cannot afterwards be handled without injury. About fifteen minutes are sufficient to make them white and clean looking.

After the specimens are bleached, dry them in white blotting paper, beneath a gentle pressure. Of course, in this, as in other things, a little practice is needed to secure perfection. Simple leaves are the best for young beginners to experiment upon; vine, poplar, beech and ivy leaves, make excellent skeletons. Care must be exercised in the selection of leaves, as well as the period of the year when the specimens are collected, otherwise failure will be the result. The best months to gather the specimens are July to September. Never collect specimens in damp weather, and none but perfectly matured leaves ought to be gathered.

A soft tooth-brush is a capital instrument for removing the soft tissues—much better than the finger and thumb. Indeed, it is always advisable not to touch the leaves during the process, but to float them on a piece of wood when the brushing process is to be gone through.

Potatoes first introduced into Ireland in 1586.

CHALK.

It is odd to think that a bit of chalk has to be brought all the way from the cliffs of Dover before it can make marks on your walls; but it is wonderful to learn that that bit of chalk is composed of the elytra, or shells of myriads of little animals, the *globierginoe*, that lived and died in the ocean, year after year, age after age, for hundreds of thousands of years, and then, solidifying into compact rock, were pushed up five hundred feet above the surface of the sea. The bed of the English channel is supposed to be of solid chalk, many hundred feet thick, extending over to France, and cropping up near Paris. Through this soft material the contemplated tunnel is to be bored, the bill authorizing the work having already passed through the House of Commons.

There is scarcely a trade or manufacture, workshop or school, that does not find a use for a bit of chalk. Great quantities are ground up for whiting and putty, and, though it is an humble material, yet nothing can supply its place. There is little or none found in this country; all that is used here being imported from England, either kiln-dried or in blocks as it is quarried, at about $10 a ton.

QUICKSILVER.

The chief mines of mercurial ores are found in Spain and Austria, those of Spain being the most important. They are known as the mines of Almaden, and are situated in the province of La Muncha. The ores are found in a wide belt running east and west, extending from the town of Chillon to Almadenejos. According to Pliny, these mines were worked by the Greeks at least seven hundred years before the Christian era, for the purpose of obtaining cinabar, which was made into vermilion. They have been worked almost continually since that time; the ore in the main vein is about forty to fifty feet thick. The average yield of the ore is ten per cent., but much is lost by the imperfect method of extracting it. In former times the mines were worked by criminals of the State, but now the workmen are hired. The vapors from the imperfect process for the extraction of the metal from the ore, causes a variety of diseases in the workmen, and limits their lives to only a few years. These mines are the property of the government, and of late years they have been leased by the Rothschilds of Europe. Both Peru and Mexico contain mines of mercurial ore: the native Indians of Peru worked the mines before the arrival of the Spaniards. The chief mine is that of Santa Barbara, and has been worked since 1566. In Mexico there are deposits of ore in several places; from the mines of California the yield is enormous—estimated to be over two million pounds. The chief use of mercury is in extracting gold in gold mining; it is also used as an amalgam with tin in silvering the backs of mirrors. There are various other purposes for which mercury is used which have come into demand in the varied industries of modern times.

ARTIFICIAL ICE-MAKING.

The process of making ice at the great manufactory at Montgomery is as follows: The water is distilled, put into rectangular tin cans, thirty inches long and nine and a half inches wide and three-fourths of an inch thick. These are placed in rows in tanks filled with salt water, coming not quite to

their tops. Ether, which has been liquidized in an adjoining room under a pressure of from seventy to one hundred and ten pounds to the square inch, is then forced into about one hundred pipes in each, filling all the tubes as it expands into a gas. The ether extracts the caloric from the water surrounding the tube, equalizes the temperature, and brings the whole below freezing point.

The distilled water congeals readily, and the salt is brought down several degrees colder than ice, without freezing. The gas passes on to a receiver, and is again made to do service. It is difficult to confine it, but if allowed to escape, the same quantity can be used continually. It is said that ether is better than mercury, as the latter eats out copper and iron pipes quickly, while the former does not affect the metals. Three times a day the cans are taken out, dipped into hot water, which loosens the cake inside, and slabs of ice are produced weighing twenty-five pounds each. Four of these are piled on top of each other and allowed to freeze together, making one hundred pounds to the block.

CHIMNEYS.

History has failed to record the inventor, or to define the place where the chimney was first used. They seem to have been common at Venice before the middle of the fourteenth century. An inscription over the gate of the school of Santa Maria della Carita states that, in 1347, a great many chimneys were thrown down by an earthquake; a fact which is confirmed by John Villani, who refers the event to the evening of the 25th of January. Chimneys had also been in use at Padua before 1368, for in that year Galeazo Gataro relates, that Francisco Carraro, Lord of Padua, came to Rome, and, finding no chimneys in the inn where he lodged, he caused two chimneys, like those long in use in Padua, to be constructed by the working people he had brought with him. Over these chimneys, the first ever seen in Rome, he affixed his arms, which were remaining in the time of Gataro. Fires were, previous to that time, kindled in a hole in the middle of the floor—and it has been a subject of much dispute whether the Romans had any artificial mode of carrying off the smoke or whether it was allowed to escape through the doors, windows and openings through the roof. This was probably of little inconvenience to them, as the climate and habits of the people led to their houses being more open in their construction than ours. It is known, besides, that the rooms in Roman houses were heated by hot air, which was brought in pipes from a furnace below. In Greek houses it is supposed that there were no chimneys, and that the smoke escaped through a hole in the roof. In England there is no evidence of the use of chimney shafts earlier than the 12th century. When once introduced there, its merits were soon appreciated. It is stated that in the reign of Queen Elizabeth, apologies were made to visitors, if they could not be accommodated with rooms provided with chimneys, and ladies were frequently sent out to other houses, where they could have the enjoyment of this luxury. In Rochester castle complete fire-places appear, but the flues go but a few feet up in the thickness of the wall, and are then turned out through the wall to the back of the fire-place, the apertures being small oblong holes. The earliest chimney shafts are circular, and of

considerable height. Afterward they are found in great variety of forms. Previous to the 16th century, many of them are short, and terminated in a spire or pinnacle, having apertures of various shapes. These openings are sometimes in the pinnacle, and sometimes under it, the smoke escaping as from some modern manufacturing chimney stacks, which are built in the form of an Egyptian obelisk. Clustered chimney stacks do not appear until late in the 15th century. The earlier ones consist of flues which adhere to each other and are not separate, as was afterward the practice.

Tall factory chimneys, usually made of brick, are very costly structures, many of them exceeding in height our loftiest cathedral spires. Their construction has been greatly economized by building them from the inside, and thus saving the expensive scaffolding. Their walls are built very thick at the base, and gradually thinner upwards; recesses are left at regular intervals in the inside, and stout wooden or iron bars rest upon these to form a temporary ladder for the workmen to ascend; the materials are hoisted by means of ropes and pulleys.

Sheet-iron chimneys are much used in Belgium They are cheaper than brick, but less durable, and are objectionable on account of their rapid cooling by the action of the external air.

One great defect in the construction of chimneys, arose from the great capacity of the flue in proportion to the extent of the fire, the heat of which was often insufficient to determine an upward current for carrying off the smoke. Science was unable, or did not condescend, to investigate the subject, and thus the defects in chimneys continued to exist through many generations.

CONSTANT ELECTRIC LAMP.

It is well known that, under the influence of a strong electric current, a body which is a good conductor, when connecting the two poles of the current, may be heated to such a point as to become luminous. This phenomenon is turned to account by Mr. Lodygin, of St. Petersburg, for obtainining a constant light, which is both reasonable in cost and also capable of being used under all circumstances. Instead of producing the electric light by means of the wearing away of the electrodes, as has hitherto been the practice, that is to say by the ignition of the particles of charcoal which are transported from one pole to the other in a body of air heated to a high degree between the electrodes, Mr. Lodygin employs a short stick of charcoal, in a single piece, and reduces the area of its section between the two electrodes in such a manner that it offers considerable resistanee to the current; so that the portion between the two poles, being heated to a high degree, becomes luminous, just as a metallic wire would do. The lamp consists of a cylindrical glass vessel, closed with metal covers so as to be air-tight both at top and bottom. Occupying the center of this cylinder is the stick of charcoal held in its place by two pieces of metal communicating, through the covers, with the two electrodes of the battery. In order to render the light more intense, several sticks of charcoal may be placed in the same lamp. The conducting wire which leads the electricity from the battery communicates with an insulated rod connected with the cover and in contact with the first piece of charcoal; the electric current then passes into the second piece of charcoal through the lower cover, and from thence to

the next lamp or to the battery. On account of the heating of that part of the charcoal which is reduced in thickness, the surface rapidly becomes oxidized when in contact with the oxygen of the air, and the charcoal is consequently worn away, a circumstance which would tend to considerably limit the duration of the lamp. To avoid this drawback, however, the lamp is filled with nitrogen, which is prevented from escaping by the two air-tight covers; in this manner oxidation cannot take place, and the pieces of charcoal preserve their original dimensions. The experiments have given such good results that the inventor has been awarded the Lomonossov prize by the St. Petersburg Academy of Science.

SPEAKING TUBES.

Speaking tubes first came into use in consequence of the singular exhibition about sixty-five years ago of what was called the *Invisible Girl.* In an empty room was seen an apparatus resembling a large ball having four speaking trumpets attached to it, the whole being suspended by silken strings in the middle of a frame-work nearly of the form of that of a tent bedstead, in no part of which was it possible for a human being to be concealed. If a visitor applied his mouth to either of the trumpet-mouths and asked some question, a reply was given by some voice which seemed to proceed from the ball, which occasioned the name, the Invisible Girl.

Although this illusion created much curiosity in the public, and the apparatus was examined for months by numerous ingenious persons, yet no one hit upon the mode in which the effect was produced, it not being then generally known that sound could be conveyed through tubes, and the tube through which the sound was really conveyed being concealed. The following, however, was the construction of the apparatus: the frame-work contained a metallic tube, and this tube passed under the floor into an adjoining apartment. The person who gave the answer to a question put at the trumpets, applied his mouth at the end of this tube, and the sound was conveyed by its means to the points in the frame opposite the trumpet mouths, which they entered and were reflected back, and seemed, therefore, to issue out of it. When the effect of this conveying tube became publicly known, the exhibition closed, and tubes have, since that time, been very generally employed to convey the sound of the voice as above mentioned.

HISTORY OF BREAD.

Like most arts of primary importance, the invention of bread long preceded the period of its history which is involved in the usual obscurity of early times. The Greeks were accustomed to deify the authors of discoveries, and they accordingly ascribed the introduction of agriculture to Ceres and the invention of bread to Pan; but the Chaldeans and Egyptians were acquainted with these arts at a still more remote period. The sacred writings make mention of it in the days of Abraham, "and Abraham hastened into the tent to Sarah and said: make ready quickly three measures of fine meal, knead it and make cakes upon the hearth." In the paintings discovered in the tombs of Egypt, the various processes used by the ancient Egyptians in making bread are distinctly represented.

At what time and by whom the art of *fermenting bread* was discovered is not known, but accident is very likely to have given rise to it in more places than one. We learn from the Scriptures that leavened bread was known to the Isrealites as it was also to the Egyptians and inhabitants of Greece; but it appears that fermented bread was not introduced into Rome until 550 years after its foundation, or about 200 years before the Christian era. Pliny informs us that the Romans learned this, with many other improvements, during the war with Perseus, king of Macedon. The armies, on their return from Macedonia, brought Grecian bakers with them into Italy; and these were called *pistores,* from their ancient practice of bruising the grain in mortars. The profession of a baker was held in great estimation, and in the reign of Augustus there were 329 public bake-houses in Rome, which were chiefly occupied by Greeks who long continued to be the only persons who understood the art of making good bread. These bakers were incorporated and enjoyed considerable privileges, and had the care of the public granaries.

The art of making fermented bread found its way into Gaul, but it seems to have remained long unknown in the north of Europe. In the middle of the sixteenth century unfermented cakes kneaded by the women were the only bread known in Sweden and Norway. In this country, probably, the baking of bread was at first universally a part of domestic economy, and it does not appear at what period it became a distinct profession; nevertheless it is so at present more or less in every country of Europe, and the practice is nearly the same in all. There is reason to think, from a passage in Pliny, that the ancients were acquainted with the use of yeast in fermenting bread, yet it was only toward the end of the seventeenth century that it became generally employed for this purpose in the north of Europe. About this time the bakers of Paris brought yeast from Flanders for the purpose of baking, and as a substitute for leaven. Although by this means the bread was manifestly improved both in appearance and flavor, the French government prohibited the bakers from employing yeast in its manufacture, under a severe penalty, in consequence of the representations of the College of Physicians, in 1688, who declared it to be injurious to health. This order was, however, evaded; the yeast was put into sacks in Flanders, and the moisture being allowed to drop out, it was secretly brought in a dry state to the capital of France. The superiority of yeast bread in every respect soon became apparent; the decisions of the medical faculty were forgotten; the prohibitory laws were allowed tacticly to sink into oblivion, and the new mode of baking found its way into other countries.

UNBOLTED WHEAT.

Near the close of the last century, when England and France were waging war with each-other, the British Parliament passed a law, to take effect for two years, that the army at home should be supplied with bread made from unbolted wheat meal, solely for the purpose of making the wheat go as far as possible. At first the soldiers were exceedingly displeased with this kind of bread, and refused to eat it, but after two or three weeks they preferred it to fine flour bread. The result of the experiment was, the health of

the soldiers improved so much, and so manifestly in the course of a few months, that the officers and physicians of the army publicly declared that the soldiers were never before so healthy and robust, and the diseases of many kinds had almost entirely disappeared from the army. For a while the use of this bread was almost universal in public institutions, and in private families, and it was pronounced by civic physicians, by far the most healthy bread that could be eaten. The testimony of sea captains and whale men is equally in favor of wheaten bread. "The coarser the ship-bread is, the healthier is my crew," said a very intelligent sea captain of thirty-seven years experience. The inhabitants of Westphalia, who are a hearty and robust people, capable of enduring the greatest fatigues, are a living testimony to the salutary effects of this sort of bread; and it is remarkable that they are very seldom attacked by acute fevers, and those other diseases which arise from bad humors. In fact, the laboring class throughout Europe, Asia, and Africa, use bread made out of the whole grain; happily for them, they cannot afford to buy fine flour.

The more intelligent class of people in our large cities have bread made of unbolted wheat on their tables every day, and depend upon it; but in country places the idea prevails that it is cheap and coarse, and that to feed a guest on Graham bread would be inhospitable. Nothing can be further from the truth. Our first-class hotels have regularly on their bills of fare "cracked wheat" "hominy," "oat-meal mush;" and some advanced teachers of hygiene are beginnning to hope that the reign of fine flour is passing away. Of oat-meal as a diet one of our writers says: "Americans are gradually awakening to the fact that oat-meal is by no means an unimportant article of diet. As a food, the merit of which has stood the test of centuries, and which is designed to promote the sanitary condition of the nation, by laying the foundation for more ready and vigorous frames for the coming generation, let us regard its adoption as an article of diet as nothing short of a national good. Its phosphorous gives a healthful impulse to the brain, and on no other food can one endure so great or so prolonged mental labor as on oat meal porridge."

BROMINE AND IODINE.

The bromine of commerce was derived mostly from salines until the salt mines of Stassfurt where opened. The method of manufacture is similar to that followed in the separation of iodine.

Upon opening the mines of Stassfurt, bromine was found in the mother-liquors in considerable quantities, and at present the principal part of the European product is derived from this source. As high as 300 grs. per gallon have been obtained from these mother-liquors. Although but two or three of the manufactories at this place have economized this substance, the price of bromine has greatly decreased during the last five years. This decrease has been hastened by the large production of bromine in the United States.

Although the amount of bromides in the Saratoga waters is considerable, yet the comparatively limited flow of water here, and the large consumption of these waters for medicinal purposes, precludes the manufacture. But from the strong salines our supply is derived in large quantities. At Tarentum, Sligo and Natrona, in Western Penn-

sylvania, Pomeroy, Ohio and Kanawha, West Virginia, the manufacture of bromine has become of considerable importance.

The total product of iodine in Great Britain and France is about 200,000 annually, and outside these two countries very little is produced. As the average product of iodine is about ten pounds to the ton of kelp, and it requires twenty tons of wet weed to produce one ton of kelp, this total product represents the burning of 400,000 tons of sea-weed. At the present price, the iodine produced is of more value than the alkaline salts, which were the original object of the industry.

The chief consumption of iodine and bromine is for medicinal purposes in the form of iodides and bromides of potash, soda, or ammonium. A small proportion is consumed in photography. Bromine has been proposed as a discharge in calico printing, and during the late war was to some extent employed as a disinfectant. As yet but a small proportion of the bromine of the saline mother-liquors is economized; but should the manufacturers turn their attention to this important substance, the consequent reduction in price will render its economical employment in other directions possible.

THE ORIGIN OF ROMAN ARCHITECTURE.

It is a commonly received opinion that the Romans derived the most of their art, and especially their knowledge of architecture, from Greece; and that, while by the mixture of styles they vitiated the purity of its taste, the improved knowledge manifested by their great works, and especially by their arches, bridges and *cloacæ*. was the result of their own discoveries. Researches in Etruria have, however, established the fact that, long before the Romans were familiar with Grecian art, long even before Romulus laid the foundation of his city, a people existed in Italy who had attained a degree of civilization to which in some respects that of Greece itself was secondary. Of these people no trace exists beyond their architectural remains; but these show that they were all acquainted with the higher principles of masonry, and were the true source whence the Romans derived their knowledge of architecture. Unlike the rude polygonal masses which form the walls of Mycenæ and Tiryns, the walls of the Etruscan cities were built of rectangular blocks laid in courses and skillfully chiseled. The cities have disappeared, but traces of the walls remain. It was from the Etruscans that the Romans derived their knowledge of the arch, of which they were, if not the inventors, at least the earliest people on whose buildings it distinctly appears. Of the arch the Grecians and the Egyptians were probably ignorant, for the vaulted roof of the Treasury of Athens at Mycenæ is merely a rude dome, formed by converging horizontal courses of stone, and the arch at Thebes (the only genuine specimen found in Egypt, for that at Saccara is a simple lining of the rock), bears strong evidence of Roman workmanship. The Etruscans, however, preserved the arch in perfection—witness the Gate of Hercules at Volterra and the Gates of the Theatre of Ferrento at Viterbo. But their use of the arch was not confined to gateways. Bridges still exist spanning the rivers and ravines of Etruria, on which the stalactites formed indicate an antiquity far exceeding that of Rome, and traces of aqueducts and vaulted

sewers, which must have, in the first instance, suggested the mighty works of the same character at Rome. In the neighborhood of their ancient cities are found traces of paved roads long anterior to the Via Appia; and they have left still more remarkable evidences of their advancement in the tunnels (*cuniculi*) with which they penetrated the solid rock, and the conduits (*emissarii*) with which they drained their overflowing lakes and diverted the courses of their rivers.

It is remarkable that, from the remains left by these people, we are enabled to form some idea of their cities. These suggestions are found in their *necropoleis*, or cities of the dead, which, unlike the sepulchral monuments of Greece and Rome, are, as in Egypt, hewn from the solid rocks. These *necropoleis*, from their uniform plan, were evidently constructed on the model of their living cities. Not only are the rocky tombs arranged in regular streets, but at intervals inclose squares like the piazzas of a modern city. The interior of the tombs are divided into apartments, of which the principal bears a close resemblance to the *atrium*, or hall, which it is known that the Romans borrowed from the Etruscans. The walls are paneled in relief, and in places carved into arm-chairs with foot-stools, and the chambers are filled with articles of furniture of a similar character to those found in Pompeii.

Thus we find in the architecture of a defunct nation clear evidence of a high civilization and refinement existing in Italy long prior to the foundation of Rome, and from which Rome herself received her chief lessons in art. From these remains we learn that it was from Greece that Rome derived the ornamental features of her architecture (in which respect, however, she was far from improving on her teacher) for the great works which render her famous beyond all cities, she is indebted to another race—a race like her own—purely Italian.—

TROPICAL FRUITS.

The Lemon grows wild in the north of India and has been long in cultivation among the Arabs who carried its culture into Europe and Africa. In the tenth century it was transplanted from the gardens of Oman to Palestine and Egypt and the crusades paved its way to Italy. At the present time it is distributed over the whole of Asia and other parts of the world. There are over thirty varieties of lemons in cultivation and are generally classified according to the port from which they are shipped. The principal supplies received in this country are from Sicily and are known as Messina lemons, they are generally of an oval shape with a thick rind, smooth or rough and an abundant sour juice.

The Citron or citron lemon, as it is called is native in Tropical Asia. The Jews, who at the present day use it on festive occasions, became aquainted with it during their captivity. It was unknown in Greece before the time of Alexander the Great, Royle has met with the citron growing wild at the present day in the forests of Northern India. The fruit is as much as six inches long, ovate uneven on the surface and with a protuberance on the top. In curing the citron, it is first pickled to extract the bitter flavor and absorb the oil, then boiled and placed in a solution of sugar until it becomes saturated, when it is placed on racks to

dry; it is then packed in boxes for the market.

The Pine-apple is a native of South America, and from the testimony of Humboldt grew wild in the forests of Orinoco. From this region it was transplanted to Asia and Africa. Columbus became aquainted with it in 1493, on the Island of Guadalope. The fruit called the pine-apple is not in reality one fruit but a collection of many, what are called the pips, being the true fruit so that the pine-apple is a head formed of many fruits closely united together.

The Fig is a native of Asia and Barbary. It has been cultivated in Persia and North Africa from time immemorial. According to Magnos the Fig first led the way to civilized life. One Grecian tradition says Dionysius Sycetes was the discoverer of the fig-tree. Another that Demeter brought the first fig-tree to the nurseryman Phytalos; a third tradition states that the fig-tree grew up from the thunderbolt of Jupiter who persecuted the Titan Syceas whom his mother Garca hid in her lap. The most celebrated fig-tree stood upon the sacred road from Ahens to Eleasis. Cortes carried it to Mexico in 1560. It was first introduced in this country by Wm. Hamilton about 1790. Owing to the severe winters there is great difficulty encountered in its cultivation in the United States and the trees are sometimes killed as far south as Florida.

The Prune is largely grown in France, Germany, Spain and Turkey. A large portion of the French prunes are made from the St. Julia plum and are of inferior quality. The most of the fine prunes are retained at home and a large quantity of those shipped to this country are of a poorer quality.

The Pomegranate is a native of China and the South of Europe. In ancient times it was cultivated in Palestine, Persia and Northern India. It grows and bears very readily in this country as far north as Maryland and the Ohio river, though the fruit does not mature well north of Carolina except in sheltered places. Medicinally it is cooling and much esteemed in fevers and inflammatory disorders.

A BEAUTIFUL ORNAMENT.

Take a goblet with the foot and stem broken or cut off so that the bowl will be perfect; take coarse flannel, the redder the better, stitch it neatly around the bowl, or goblet, so as to cover it completely on the outside; dip it in water, so as to wet it thoroughly, then roll it in flaxseed; the seed will stick in and on the flannel; be sure that the seed is distributed even, then stand it on its mouth, or large end, in a saucer or small plate; put water in the small plate, or saucer, and renew or add to it as it absorbs. Never let the vessel get dry, nor suffer it to chill nor freeze. It can and will grow in any part of the room, and will be a deep green with a red ground.

CALICO PRINTING.

The art of producing a colored pattern or cloth by the application of coloring substances, appear to be of great antiquity. Homer notices the variegated linen cloths of Sidon as magnificent productions, and Herodotus says that the inhabitants of Caucasus adorned their garments with figures of animals by means of an infusion of the leaves of a tree, and that the colors thus obtained were durable. Pliny's description of the art as practiced by the ancient Egyptians

is almost identical with the modern process. He says: They take white cloths and apply to them not colors, but certain drugs which have the power of absorbing or drinking in color; and in the cloth so operated on there is not the smallest appearance of any dye or tincture. These cloths are then put into a cauldron of some coloring matter scalding hot, and after having remained for some time are withdrawn, all stained and painted in various colors.

This is indeed a wonderful process, seeing that there is in said cauldron only one kind of coloring material. Yet from it the cloth acquires this and that color, and the boiling liquor itself also changes according to the quality and nature of the dye-absorbing drugs, which were at first laid on the white cloth. And these colours are so firmly fixed as to be incapable of being removed by washing. If the scalding liquor were composed of various tinctures and colors, it would doubtless have compounded them all in one on the cloth; but here one liquor gives a variety of colors according to the drugs previously applied. In India the art of calico-printing has been practised for ages, and it derives its English name from *Calicut*, a town in the province of Malabar, where it was formerly carried on extensively. The art of calico-printing was practised in Asia Minor, and the Levant several centuries before its introduction to Europe. It was not till the close of the seventeenth century that Augsburg became celebrated for its printed cottons and linens, and that city was long a school for the manufacture of Alsace and Switzerland. The art was introduced into England about the year 1676, by a Frenchman who established works on the banks of the Thames, near Richmond. More extensive ones were established soon after at Brownley Hall, in Essex. There are various methods of calico-printing, the simplest of which is block-printing by hand, in which the pattern, or a portion thereof, is engraved in relief upon the face of a block of holly or pear-tree wood, backed with deal and furnished with a strong handle of box-wood. In some cases the pattern is formed by the insertion into the block of narrow strips of flattened copper, the interstices being filled with felt. This gives a very distinct impression. The block is charged with color by pressing it upon a surface of woolen cloth stretched tightly over a wooden drum. The printing table is about six feet long, and is made of mahogany, or marble, or flagstone, or any material capable of forming a flat, hard surface. This table is covered with a blanket upon which the calico is spread, and the block being charged with color as above described, the person applies it to the cloth in the exact spot required, and in some cases strikes it on the back with a wooden mallet, in order to fully transfer the impression. Care is required to place the block in the exact spot so as to make one impression exactly join or fit in with the previous impression, and for this purpose the block is furnished with small pins at the corners, which make holes in the cloth and serve as a guide to the printer. The invention of *cylinder* or *roller printing* is the greatest achievement that has been made in the art. A length of calico equal to one mile can by this method be printed off with four different colors in one hour, and more accurately and with better effect than block printing by hand. The invention of this machine is attributed to two persons who had no connection with

each other. One was a Scotchman named Bell, who, about the year 1785, brought into successful use at Mossuly, near Preston; the other was named Oberkampf, a calico-printer of Jouy, in France. The introduction of the cylinder machine gradually caused the disuse of the flat press—the London printers continuing to use them long after the Lancashire printers had given them up. The first cylinder machine was used in London in 1812.

KNITTED WEAR.

The history of knitted wear abounds in many familiar anecdotes and stories. The romantic mystery surrounding the invention of the stocking frame by Lee, and the trials and struggles of that unfortunate inventor, are familiar to all; while the early labors of Strutt and Arkwright in England, and Moses Brown and others in the United States, had far better fruition. These latter men died rich, while Lee, unjustly despised at home, died in poverty in a strange land.

The first knitting, it is said, was the result of enforced idleness. The brain and fingers of men when idle are scarcely ever at rest. They will twist and twine and intertwine; loop, plait, knot and knit in ways infinitely various. By this course river flags were formed into baskets, the bark of trees into ropes, and bullrushes interlaced and made into an art plastered with bitumen might safely glide down a stream bearing a baby prophet to a princess' arms. From these ancient arks, by tentative reasoning, we may easily trace the formation of yarn or fibre into garments.

The first knitted wear in England was apparently that of caps. By act of Henry VII. in 1488, the price of felted hats was stated to be 1s. 8d., and knitted woolen caps 2s. 8d. The manufacture of these caps must have been carried on for some time before they would become important enough to be mentioned by an act of Parliament. After caps came hand-knitted hose, and this art is supposed to have originated in Scotland, where the knitted cap still retains its prestige as a national garment.

Lee's stocking loom was first introduced into America about one hundred and thirty-four years after its invention, but it was not until after the Revolution that many were imported and worked in this country. Hand-knitting during the eighteenth century was the great household art in the colonies and States. This art was fostered by premiums of considerable value, and the thrifty housewife's principal pride was the number of stockings she had in hand for use.

The first printed mention of the use of knit hosiery in America is an item of an outfit to be shipped to New England in 1629, in which "one hundred pairs of knit stockings, at 2s. 4d. a pair," are included in an invoice with "sutes of dublett and hose, lyned with oyled-skin leather, ye hose and dubletts with hooks and eyes." Leather here at this time was a common article of apparel, knit hose being reserved for the nobility. Large quantities of coarse hand-knitted hosiery continued to be produced in America during colonial times, much of the wool being spun as worsted, with double thread, and used for knitting. In 1662 the Virginia Assembly offered a premium of ten pounds of tobacco for every dozen pair of knitted stockings, and just 100 years ago, when the scheme of Independence was incubating, the Assembly of the to-be Mother of Presidents offered £50 for every five hun-

dred pairs of stockings produced for men and women, with the privilege of buying them at 75 per cent. advance on that price. Before this, in 1698, knitters of coarse yarn stockings in Pennsylvania received half a crown a pair, and hosiery from Germantown, the seat of the trade and home of the German Palatines in that commonwealth, became one of the principal features of the semi-annual fairs established by Wlliam Penn in Philadelphia, which exhibitions will culminate next year in the Centennial Exhibition. Knitted silk underwear was occasionally used before the Revolution, but it was all hand work. Governor Law, of Connecticut, is reported to have worn, in 1747, a coat and stockings of New England silk, knitted in that State, in which the growth and manufacture of silk first obtained a permanent place among our industries.

The first mention of hosiery knitting by frame-work in America is in 1723, when Matthew Burne, of Chester county, Pa., is stated to have served one or two years at stocking weaving with John Camm, and that Camm's stockings had a good repute.

About the time that the first frame was erected in America, Mr. Cartwright, founder of the firm of Cartwright & Warner, which goes back for generations, had a severe contest with the chartered company of Frame-Work Knitters of England. This guild was incorporated by an act of Charles II., and the officers made many oppressive laws, and enforced them by severe fines. Observing that the trade had declined in the City of London about 1725, the frame owners having migrated to Nottingham and other districts, the guild sought to frighten the manufacturers by levying a fine on those who removed after the Company had declared they should not. A Mr. Fellows was fined £400, and Mr. Cartwright £150. They refused to pay, and their goods and frames were sold by the beadles of the Company. Cartwright immediately brought an action for trespass against the officers of the Company, which was finally tried in 1728. After a protracted legal contest a verdict was given to Cartwright, and the subdued and powerful guild's power was broken in Nottingham, and for a long time afterward its rulings were restricted to the London district. Plain work soon came into fashion, and, as labor was cheaper in the country, Nottingham and Leicester soon obtained the trade of the London merchants, Cartwright, by his energy, having paved the way for the country manufacturers to triumph over those of the city.

In 1747 a stocking manufactory at Annapolis, Md., was considered a great curiosity, but it was not a success. In 1776 the Committee of Safety of that State appropriated £300, to enable M. Coxenfender to establish a stocking frame in Frederick county.

In 1764 the Society of Arts in New York offered £10 premium for the first three stocking looms of iron set up during the year, £5 for the next three, and £15 for the first loom manufactured in the Province.

In 1777 it is reported that one hundred stocking weavers and their looms were idle at Lancaster, Pa., and in 1786, only three weavers were in that town.

James Wallace, a foreigner, and Benjamin Hanks, a native, asked the Assembly of Connecticut in 1777 for a loan or premium for manufacturing cotton, silk, worsted and thread hosiery, and were refused.

Looms were put up about 1798 in Rhode Island, and Moses Brown, of Providence, bought a frame set up at

East Greenwich, in that State, by John Fullem, an Irish stocking weaver.

In March, 1794, Michael Troppal, of Newark, N. J., petitioned Congress for more duty on hosiery, but a duty of 5 per cent. was all that was deemed proper to impose at that date. In 1816 it was laid at 20 per cent. *ad valorem*, on wool and cotton; in 1828 to 35 per cent. on kit woolen goods; in 1832 reduced to 25 per cent.; in 1842 cotton and woolen hosiery duties were fixed at 30 per cent.; in 1846 reduced to 20 per cent. on cotton; in 1857 duty on both laid at 24 per cent.; in 1862 raised on both kinds to 35 per cent. *ad valorem*. From that year the mutations of the tariff were frequent, until now the duty is so high that very few garments of knit woolen underwear are imported unless over 80 per cent. per lb. value.

In England the production of stocking frames for special purposes increased in variety greatly until 1800, when, owing to changes of fortune, fancy hoisery commenced to decline, and continued to do so for forty years.

Previous to this date, Jedediah Strutt, a farmer in Derby, adapted the stocking frame to the manufacture of ribbed goods, similar to that knit by hand, and which is so necessary to a neat and close fit in underwear. It was with Strutt that Samuel Slater acquired a knowledge of the cotton business, which he afterward introduced into the United States. Slater had been a clerk, and afterward overseer, in Strutt & Arkwright's mill, the latter having woven cotton yarn, which was found to be well adapted for machine knitting, and afterward forming the partnership with Strutt.

New York City had in 1820 a few looms weaving stockings, pantaloons and drawers.

In 1832, the first power loom for weaving stockings or stockinet was invented and put in operation at Cohoes. It was invented by Timothy Bailey of Albany, at the suggestion of Egbert Egberts. This machine was simply the stocking frame of Lee adapted to power. It produced a web 28 inches wide at the rate of an inch a minute; this was afterward cut and seamed into garments. By the hand loom it was a day's work to knit two pairs of drawers, while a girl by the power loom could knit twenty in the same time. In 1834, Joseph Whitworth, the celebrated mechanician, introduced in Manchester, Eng., an American knitting machine, which was, I believe, the machine invented by Bailey. In this machine the process of narrowing had to be conducted by hand. These machines cost much more than the ordinary frames, and they did not come into general use in England.

Among the noted inventors of knitting machinery was Brunel, the engineer of the Thames tunnel. He resided in New York a long time, and constructed an arsenal and cannon foundry here. Some years after his return to England he patented a round hosiery frame.

To Mr. M. Townsend, first a framework knitter, then a hosier in Leicester, the invention of round hose, with heels and toes fashioned on other machines, is due. Mr. Townsend did not succeed very well in England, although in the front rank of skillful manufacturers of hosiery, and finally came to America, where his undoubted skill met its due pecuniary reward.

It is impossible within the limits of a newspaper article to sketch the important improvements in the trade of the past forty years. They have been so numerous, and such great results have

been obtained, that a large-sized book will scarcely contain them. Bennett Woodcroft, in his introduction to the Abridgement of British Specifications of English Knitting-machine Patents, gives much useful information regarding the knitting mechanism of England. Our inventors have not been behind-hand, and France, with its seamless hosiery looms, Aiken of Franklin, N. H., with the latch-needle machine for use in families, or for power; Wilson of New York, for his improved circular machine, and many others, have successfully supplemented the earlier work of the Strutts, father and sons, Arkwright, and others.

The changes of fashion have at times totally changed knitting machinery. Among the styles of hosiery in fashion for the past seventy-five years may be mentioned open-worked insteps, cotton hose ornamented with glazed linen thread, silk twilled hose, silk and cotton non-elastic platted twilled and platted plain hose, warp-vandyked hose, shamoy-shaped hand and tickler-made cotton, tuck ribbed, worsted imperial hose, silk stockings, shamoy-shaped embroidered silk hose, and silk-narrowed clocks, a fashion now revived. The art of "chevening" hose (embroidering with a needle) is an old one. It had long been done in France and Spain before it was commenced in England. In the year 1783, Mrs. Elizabeth Drake commenced it in Nottingham, and it soon came into great repute.

PERCENTAGE OF PROFIT.

To find the percentage of profit substract the cost from the selling price, add two ciphers to the remainder and divide by the cost; the answer will be the percentage of profit. Example: If a pound of raisins cost 15 cents, and you sell them for 20 cents, what will be the percentage of profit? Substract 15 from 20 and you have 5 as a remainder. Now add two ciphers and you have 500; divide this by 15, the cost of the raisins, and the result will be $33\frac{1}{3}$, the exact percentage of profit. To find the percentage of loss on any sale you simply reverse the terms.

HOW BROADCLOTH IS MADE.

In the *British Trade Journal* is the following comprehensive summary of the various processes by which wool is made into broadcloth;

"The better to manifest what woolen is not, let us see what cloth is. Stage by stage, from sheep's back to gentleman's back, we will trace its history. The wool being shorn, goes to the staplers, and by him is sorted. It is neither long nor short, and, for the cloth manufacture, if wool be not moderately short, it must be shortened artificially. It is next well oiled and spun into thread or yarn, then woven into a tissue that will be cloth by-and-by, though a long way distant from cloth when it leaves the weaver. The tissue, if examined at this stage of manufacture, would display its threads just like madam's stuff gown does. A coat of this material would be threadbare all over, despite its newness. Before this material can become commercial cloth, five chief things will have to be done to it. Its texture must be closed; it must be shrunk—that is to say, it must be cleansed; a nap must be put upon it; superfluous nap must be shorn off; finally, it must be hot-pressed. First, as to the closing or shrinking. If we bear in mind what has already been stated about the qual-

ity of felting possessed by wool, due to the presence of certain saw-like teeth, the reason of shrinkage will be understood. To accomplish this is the fuller's task, and he goes to work as follows: He takes the material to be shrunk, wets it, soaps it, and submits it to the fulling-mill for a considerable time — seven or eight hours — under which operation the shrinkage is effected. The fulling machine is an engine so contrived that certain heavy piles or hammers are brought to bear upon the texture, already soaped, wetted, and laid in a trough. The hammers are so fixed in the machine that not only do they fall upon the texture with heavy thuds, but at the same time turn it about, each stroke being delivered on a fresh portion. Now, bearing in mind the saw-like teeth, and the quality of felting, what happens will easily be understood. The wool fibers are well soaped, as we already know, and but for their serration all looking one way, they would slide upon each other in various and irregular directions. Practically, however, they can only slide one way—namely, with the roots foremost. The result is that the saw-like teeth catch among each other, at every catch making the wool-fibers shorter, whereby the entire texture is shrunk, and, of course, proportionately closed up and thickened. This result being accomplished, the workman clears away the soap by means of fuller's earth and water, the fabric remaining still in the trough, and still wrought upon by the fulling hammers or piles. Being taken from the fuller's mill, the shrunken material has next to be dried. This is done by hanging it on tenter hook stuck into the margins of the texture at convenient distances. Obviously, this is an operation that would admit of considerable deceit in dishonest hands. The wet fabric might be injuriously stretched — made broader and longer to the prejudice of material. Formerly the exact amount of stretching to be used was regulated by Act of Parliament, so important did the matter seem. Our material, woven, fulled and dried, is not cloth yet, though a considerable way advanced on its road to cloth. It has no nap, so the next process will be in imparting a nap to it. Let us suppose, now, by way of introducing the nap-imparting process, that a piece of our material having been laid flat on a board, a cat gets on it and scratches it. Puss would get a sort of nap on our material, though she would deal with it somewhat roughly. If the scratching effect of cats' claws were such as the clothworker required, he might imitate the operation by some sort of wire-tooth machinery. Altogether too violent it would be; for, although nap is really scratched up out of the threads, this is effected by little hooks incomparably finer than the claws of any cat—finer than any hooks man's ingenuity has enabled him to devise, the agent used by clothiers of to-day, as by the Romans, being the hook-like growths of the *Dipsacus fullonum*, or fuller's teasel. This plant, in growth, is something like a thistle, though, botanically it differs from a thistle. It bears round heads, each about the size of a small apple, and studded all over with fine hooked protuberances. Many of these teasel-heads, being packed together and bound up tight on a flat surface, make a sort of comb, or curry-comb, and this was the invariable way of packing teasels for use in cloth manufacture once. They may be also packed on a cylinder, but however arranged, their use in geting up nap out of threads will be

obvious. Caused to rub against the incipient cloth, they scratch out little odds and ends of wool, and produce a hairy surface. One stage further, then, our woven material has advanced on the road to perfect cloth, but it is not cloth yet. The nap just scratched up by the teasel hooks is of all lengths, within certain limits. The manufacturer wants an even length, which he accomplishes by shearing. Next follows hot-pressing, which being done, we regard the cloth as made.

RULES FOR SPELLING.

The following rules should be carefully committed to memory, as the knowledge of them will prevent that hesitation about the spelling of common words which is frequently experienced:

All monosyllables ending in l, with a single vowel before it, have double l at the close; mill, sell.

All monosyllables ending in l, with a double vowel before it, have one l at the close; wail, sail.

Monosyllables ending in l, when compounded, retain but one l each; as fullfil, skillful.

All words of more than one syllable ending in l have only one l at the close, as faithful, delightful; except recall, befall, unwell.

All derivations from words ending in l have one l only; as equality from equal; except they end in er, or ll, as mill, miller; full, fuller.

All participles in ing from verbs ending in e, lose the final; as have, having; amuse, amusing; except they come from verbs ending in double e, and then they retain both; as see, seeing; agree, agreeing.

All verbs in ry, and nouns in ment, retain the final of their primitives; as brave, bravery; refine, refinement; except judgment and acknowledgment.

All derivations from words ending in er, retain the e before the r; as refer, reference; except hindrance from hinder; remembrance from remember; disastrous from disaster; monstrous from monster; wondrous from wonder; cumbrous from cumber, etc.

All compound words, if both end not in l, retain their primitive parts entire; as millstones, chargeable; except always, deplorable, although, almost, admirable, etc.

All monosyllables ending in a consonant, with a single consonant before it, double that consonant in derivatives; as sin, sinner; ship, shipper; big, bigger.

Monosyllables ending in a consonant, with a double vowel before it, do not double the consonant in derivatives, as sleep, sleeper; troop, trooper.

All words of more than one syllable, ending in a single consonant, preceded by a single vowel, and accented on the last syllable, double that consonant in derivatives, as commit, committee; compel, compelling, appal, appalling.

Nouns of one syllable ending in y, change y into ies in the plural, and verbs ending in y, preceded by a consonant, change y into ies in the third person singular of the present tense, and ies in the past tense and participle; as fly, flies; I apply, he applies; if the y be preceded by a vowel, this rule is not applicable; as key, keys; play, plays.

Compound words, whose primitives end in y, change y into i; as beauty, beautiful; lovely, loveliness.

THE degree of doctor first conferred in Europe, at Bologna, in 1130; in England, 1208.

HISTORY OF SCHOOLS.

The institution of schools is very ancient. They were first instituted for educating the higher classes of society. With the exception of what instruction their parents could impart the great mass of the people were left to ignorance. As early as 500 B. C. private schools for instructing in reading, writing and arithmetic were established in Greece. At this time the people remained in ignorance. The Romans also had schools for boys in the cities 300 B. C. Public schools were first made a feature in Greece but these schools of Sparta were intended more for physical than intellectual development. After the fifth century under the episcopal or cathedral schools were taught besides theology the seven liberal arts, viz.: arithmetic, geometry, astronomy and music.

In 780 Charlemage labored with zeal in that age of ignorance for the instruction of the people under his sway. He decided that not every convent but every parish was to have its school the former for the instruction of public officers and the latter for the lower classes of people. About the 13th century schools were established in which reading and writing were taught by itinerant monks and students who were employed as teachers.

In the 15th century Luther says Germany was overrun with persons who had received appointments as teachers because they were generally the only persons who could be hired as schoolmasters though many had hardly seen a university. Luther's ideas were far in advance of any previously held and were identical with those now common in this country and in Germany. He advocated the maintaining of schools by the civil government rather than the church. Through his influence was established a free school system in Saxony as early as 1527 which was the first of the system now so popular. At the present time the methods are different for administering the national elementary education. The system in Prussia is governmental and under pains and penalties every child in the kingdom from the age of 7 to 14 is obliged to attend. The primary schools of France are conducted in the same manner. A teacher however can open a private school under certain conditions. In England the education of the people is under the care of the Established Church. In the United States the system is entirely different. The State Government ordains that schools of a certain character must exist among a given population. The people in their capacity of free citizens determine all questions concerning the buildings, teachers, and methods of instruction.

HAVANA CIGARS.

The original name for a cigar was *tabaco*, and the original inventors of modern cigars were the red Aborigines of Cuba. The native appellation for the plant out of which cigars are made was *cohiba*. The suspicion that such is the case must have sprung up in the minds of all intelligent persons who, on examining a box of Havana cigars, discovered on the outside of it the fact that the cigars were made in a *fabrica de tabacos* which—as everybody knows or does not know—means a manufactory of cigars, and, of course, not a manufactory of tobacco.

The finest cigars that can be had are the Vigueras, which are made of the finest leaves, right on the spot in the

vegas, and which are rather expensive, and even for any amount of money somewhat difficult to procure. The ordinary price for a Vigueras Regalia Imperial—a seven-inch cigar—ranges between $200 and $300 per thousand—not in New York, but in Cuba.

Many smokers, and even cigar dealers, in New England are somewhat confused in regard to the proper interpretation of some of the names they see branded into the cedar boxes. People often feel quite confident that they buy or sell a particular quality of tobacco in the cigars when they give them the name of Regalia Imperial, Regalia, Londres, Dama, Entr'operas, or any other of this class. The fact, however, is that these names designate only the sizes of the cigars. A Regalia Imperial measures seven inches, a Regalia Britannica is a little smaller, a Londres is of the medium size, the Damas or Entr'operas are quite thin and small, fit to be smoked in the pauses between the acts, at the door-steps, or in the smoking-room of a theater.

The quality of the tobacco is indicated by the words *superfino*, *fino*, *superior, bueno*. The color and strength of cigars is stamped on the box with *maduro* for the strongest, *oscuro* for the next in strength, *colorado* for those of medium strength, and *claro* for the light ones. The intermediate shades of the cigars are indicated by combining two of these terms: thus, *colorado maduro* signifies that the cigar is a little darker, and *colorado claro* that it is a little lighter than a *colorado* should be.

There are two words which must find a place in the tobacconist's glossary—namely, the words which stare at you in every street of every town in the world of more than 500 inhabitants—*Vegas* and *Vuelta Abajo*.

The mystery of the word vegas is nothing, but the fact that it is the Cuban name for a tobacco plantation, and Vuelta Abajo is the district in which most of the plantations are found. Vuelta Abajo is a low region of Western Cuba, south of the Guaniguanico Mountains, which run from Marielbai to the Bay of Guadiana. The best vegas lie on the bank of the River Gayaquataje, on a piece of land about thirty miles long by seven deep. As a rule, a tobacco plantation contains only one *caballeria*, which is equal to about thirty-three acres. Half of it is stocked with various plants to shelter the tobacco, and, nevertheless, a *caballeria* produces as much as 9,000 pounds, averaging about $100 per 100 pounds.

As the tobacco crop is to the Cubans a matter of not less than $20,000,000 a year, all the people are willing to pray for a rich harvest. When the insects peculiar to the tobacco plant seem to be a little thick, at once regular days of prayer are appointed, and the holy Martin, the saint of tobacconists, has 10,000 masses said in his honor, to make him bless the crop and pick off the insects.

CIGARETTES.

How They Are Manufactured.

The tobacco used in the Havana factory comes chiefly from the small plantations in the western part of Cuba. When brought in, the first process is to place it on a sieve-table, set in motion by machinery. This sifts away all the sand and other foreign bodies from the leaf, twelve skillful workmen standing on either side of the table to snatch away all bad leaves or stems from the mass, as it travels along by the pressure of the mechanism. It is next thrown upon a huge ventilator, which winnows off the dust, and after that it is spread

in thin layers on outside terraces, where the tropical sun can have full play upon it and dry it thoroughly. It is then taken inside and dropped into huge casks, where it is subjected to intense hydraulic pressure, after which it is conveyed by an almost imperceptible motion, effected by means of a series of screws, beneath a huge fly-wheel, set with sharp blades, that chop it to pieces. Then it is again ventilated, winnowed and subjected to the action of finer cutting apparatus, until it is reduced to the desired tenuity, after which it is spread out on the lower floor of the building and besprinkled with an aromatic liquid, the composition of which is a secret of the manufacture. Chinamen alone are employed at this last stage, because their ignorance is regarded as a guarantee that the secret will not be betrayed. The tobacco, being once more partially dried, now requires only its paper envelopes. For these the material comes from Spain, and the Havanese cigarettes-maker imports thirty-five thousand bales of it per annum. The paper is passed beneath a press, which stamps it indelibly, and is then submitted to a mechanical knife, which cuts off hundreds of wrappers at a stroke. The final process consists of the folding and packing, and these are entrusted to hundreds of hands, some permanently employed, some working in their own rooms outside, some inmates of charitable institutions, and even of prisons. In one saloon a visitor saw three hundred convicts, black and white, hard at work rolling the cigarettes delicately between their fingers. Every workman gets a certain quantity of tobacco and wrappers, and must deliver a round of five thousand cigarettes from it, with perhaps fifty over, which he is allowed to keep for his own use. For this amount of work he gets from the overseer a metal check entitling him to the payment of one dollar, at sight, on presentation to the cashier or foreman. Everything, of course, is strictly controlled and checked, with all the aid of scientific arrangement and apparatus.

HOW TO TREAT TENDER PLANTS THAT HAVE BECOME FROZEN.

The disastrous effects which tender plants, that have become frozen, are subject to,is generally known to cultivators; but how or why freezing produces the effect it does upon plant life, is not so easily ascertained, and all attempts heretofore made by scientific men to solve the question, have been, at most, only partially successful. In practical experience it is found, that the length of time, and the degree of cold to which plants are exposed, affect them in proportion to the duration and intensity of these conditions, which points, therefore, to the speedy restoration of a suitable temperature, as the best means of restoring plants that have been unfortunately exposed to frosts. But the thawing out, should, in all cases, be moderately gradual, and one of the best things to do when plants have become frozen, either in the dwelling, conservatory, or in the open air, is to sprinkle the foliage with cold cistern or well water, as the temperature turns to rise. In the dwelling or conservatory, however, it will be necessary to start the fire in the stove, furnace or flue the first thing of all, to give the temperature an ascendency, but it should for several hours, not be allowed to rise above an ordinary suitable degree. Some advocate shading the plants from the sun and light for some length of time, but the policy of so doing has never been apparent while

some have frequently had strong proofs to the contrary; that the sun's rays striking upon the plants with gradually increasing heat, in a great measure, aids their recovery. There is a great difference in plants, as regards their ability to resist cold, and while some the slightest frost will injure beyond cure, others will bear various degrees, and even alternate freezing and thawing again and again, with impunity. Avoid handling plants in a frozen condition as much as possible, as the injury to them will be heightened should the leaves become bent or be roughly brushed over. To restore flowers that have become frozen, place them in cold water until they have thawed out.

FIRE-PLACES.

The modern form of heating our houses at the present time, and the convenience of everything connected with cookery, presents a striking contrast to the old-fashioned fire-place, which was used by our ancestors. Many of them were built large enough to burn wood four or five feet in length. The wood was burned upon irons called dogs, laid upon the hearth; many of them were made of brass and some very elaborate in design. The throat of the chimney being large, the consumption of fuel was immense. To support kettles over the fire in boiling, a crane was placed movable upon a center to which the vessels were suspended by iron hooks, that were made to lengthen and shorten to keep them near or farther from the fire. Many will remember the old iron *bake-kettle* which was used to bake corn-bread and short-cake and the iron cover with the rim turned up well filled with burning coals. Another very useful article was the *tin kitchen* with which a roast of beef or turkey on the spit would be done to a turn. In many of the kitchens or living-room would be old-fashioned seats called *settles* with high, close backs to defend those who sat in them from any cold draughts of air; the seats forming a chest for containing household articles. In many of the modern houses of the present day are fire-places with grates for burning wood or coal. They are constructed upon the most approved method on a much smaller scale, beautiful in design and ornamentation, contrasting greatly with the old time fire-place.

INSURANCE.

Insurance does not appear to have been known to the Romans, however near they may have come to the invention of it. Beckmann says, if we examine closely the information from which some endeavor to prove to the contrary, it will be found that it is far from sufficient to support their opinion. Puffendorf, Barbeyrac, Loccenius, Kulpis and others ground their assertions on a passage of Livy, who says that when the Roman army in Spain was distressed for provisions, clothing and other necessaries, a company engaged to convey to them every thing they stood in need of, under the stipulation that the State should make good their loss in case their vessels should be shipwrecked by storms or be taken by the enemy, and we are told that these terms were agreed to. This was, undoubtedly, a promise of indemnification, but by no means an insurance, in which it is always necessary that a premium should be given. On occasions of this kind, however, acts of fraud were practiced like those committed at present to the prejudice of

the insurers. Shipwrecks were pretended to have happened which never took place, and old and shattered vessels freighted with articles of little value were purposely sunk and the crew saved in boats, and large sums were then demanded as a reimbursement for the loss. Those writers who have pretended that insurance is mentioned in the Catalonian maritime laws have, perhaps, been led into error, because in an appendix to some of the common editions, there is a short account of insurance as once practiced at Barcelona.

The oldest laws and regulations concerning insurance with which the author was acquainted, are the following: On the 28th of January, 1523, five persons appointed for that purpose, drew up, at Florence, some articles which were employed for a long time on the exchange at Leghorn. These important regulations, together with the prescribed form of policies which may be considered as the oldest, have been inserted in Italian and German by Mugens in his Treatise on Insurance, Average and Bottomry published at Hamburgh in 1753. In the memoirs of Capmany is "An ordinance of the year 1458 respecting insurance, which required that underwriting should be done in the presence of a notary, and declared *policies v. scriptores privades* to be null and void. Straccha mentions a Florentine order of June the 15th, 1526, which forbids common insurance unless the goods and commodities are specified. There is still preserved a short regulation of the 25th of May, 1537, by the emperor, Charles V., respecting bills of exchange and insurance, in which the strictly fulfilling only of an agreement of insurance is commanded. In 1549, the same emperor issued an express order in which occurs some article respecting insurance, and additions were afterwards made to it in 1561. In the year 1556, Philip II., King of Spain, gave to the Spanish merchants certain regulations respecting insurance which are inserted by Magens with a German translation in his work before mentioned. They contain some forms of policies on ships going to the Indies. On the last of October, 1563, Philip II. published his maritime laws in which some forms of policies are given; but on the last of March, 1568, that prince forbade the practice of insurance on account of the bad use to which it had been often applied. There was an order issued by the king on the the 20th of January, 1570, in which he expressly recalls it, because the merchants at Antwerp, both subjects and foreigners, had presented strong remonstrances against it. In the year 1585, the Kamer von Assurantic (Chamber of Insurance) was established at Amsterdam. In the year 1600 regulations respecting insurance were formed by the city of Middleburg, in Zealand. It appears that the first regulation respecting insurances in England were made in the year 1601. The insurers had, before that period, conducted themselves in such a manner that the utmost confidence was reposed in their honesty, and that, on this account, few or no disputes had arisen. In the year 1604, regulations were formed respecting insurance at Rotterdam, and in 1610 were drawn up those of Genoa. In 1612 the Insurance Chamber of Amsterdam was established by public authority, and received several privileges. Malynes asserts that the people of Antwerp were first taught insurance by the English, and says that as the merchants assembled for transacting

business in Lombard street, so-called because Italians from Lombardy had *lombards* there, or houses for lending money on pledges. Long before the building of the Exchange it became customary, as it was in his time (1622) to be guided in policies by what was done in Lombard street in London.

Insurance companies to indemnify losses sustained by fire, were first formed toward the middle of the last century, though houses were insured by individuals much earlier. The fire-office at Paris was established in 1745; that of the electorate of Hanover in 1750; that of Nassau-Weilburg in 1751; those of Brunswick-Wolfenbuttel and Wirtemburg in 1754; that of Anspach in 1754; that of Baden-Durlach in 1758; that of the County of Mark in 1764; those of Saxe-Weimar and Eisenach in 1768, and that of the Society of the Clergy, in the Mark of Brandenburg, to insure goods and household furniture, was established in 1769. In the beginning of the seventeenth century, a proposal was made by some ingenious person that all proprietors of land should insure the homes of their subjects against fire, on their paying so much per cent. annually, according to the value of them. The author of this scheme presented it to Count Anthony Gunther von Oldenburg, in the year 1609, as a means of finance. The author in his plan said that as many fires happened by which a great number of people lost their property, the Count might lay before his subjects the danger of such accidents, and propose to them that if they would, either singly or united, put a value on their houses, and for every hundred dollars valuation, pay to him, yearly, one dollar, he, on the other hand, would engage that in the case, by the will of God, their houses should be reduced to ashes, (the misfortunes of war excepted,) he would take upon himself the loss and pay the sufferers as much money as might be sufficient to rebuild them; and that all persons, both natives and foreigners, who might be desirous of sharing in the benefits of this institution, should not be excepted.

The first regular office set up in London was the *Hand in Hand* in 1696. The first Life Insurance office established in London was the *Ammicable.* This company was chartered in 1706, in consequence of application made to Her Majesty, Queen Anne, by Sir Thomas Allen and others. The first *Marine* insurance was the Royal Exchange Insurance and the London Insurance in 1720. It is not positively known when the first insurance company was formed in the United States.

SUGAR.

Sugar has been used from an early period in the world's history, in some form or other, as an article of food; indeed the practice of sweetening food is more ancient than sugar. The ancients used honey for the purpose. Dioscorides, in the first century, refers to a kind of honey produced by canes growing in India and in Arabia Felix. Pliny records the same fact, but remarks that it was used only in medicine. Sugar was not known in Northern Europe as an article of food until the time of the Crusades. The sugar-cane was introduced into Cyprus from Asia, and about the year 1148 is said to have been largely cultivated there, at which time it was transplanted to Madeira, and from thence, in 1506, to the West Indies. There is evidence that the sugar-cane was cultivated on the coasts of Andulusia before the invasion of the Arabs in the middle of the

fifteenth century. The Arabs had many sugar factories, and with them probably originated the art of boiling down the juice for the production of sugar. The refining of the raw product is of later date, and is referred to a Venetian. In the year 1597, a refinery existed in Dresden. Sugar-*candy* is mentioned in the *Alchemia* of Libarius in 1595. Up to the close of the seventeenth century, syrup and honey were used by the poorer classes in Germany for sugar, and it was not until tea and coffee had came into general use that sugar was regarded as one of the necessaries of life. In the year 1847, Margraf, a German chemist, discovered that cane sugar existed ready formed in the roots of many plants, especially in beet root; but nearly half a century elapsed before any attempt was made to establish a factory of beet-root sugar; this was done by Archard at Cumoom, in Silesia, not, however, with any great success. The first energetic impulse that was given to the manufacture was by Napoleon, who, anxious to ruin the colonial trade of Great Britain, ordered the blockade of the continent, and in order to supply the demand for sugar, which formed so important a part of our commerce, he offered premiums for the best modes of separating sugar from beet root. The chemists of France exerted themselves with their accustomed method and skill. Extensive experiments were made on the cultivation of the beet-root, and the best methods of obtaining the juice and extracting the sugar from it. Factories were soon at work, and the first sample of French beet-root sugar was conveyed at once to the Emperor who received it with joy, and placed it under a glass case as one of the choicest ornaments of his drawing-room.

A NATIONAL THANKSGIVING.

It was not until during the war that it became customary for the President of the United States to appoint, by proclamation, a National Thanksgiving day. The celebration of the day itself began in the very early history of the Massachusetts Colony, and has spread from New England westward and southward over the whole land. For many years it was appointed in the various States by the Governor thereof, and, there being no concert of action between them, would be held at different dates, though almost always on a Thursday. An effort was made to unite on one day—the last Thursday in November—as the day of Thanksgiving, and in 1859 thirty of the thirty-three States then existing held their Thanksgiving holiday on that day. In 1863 President Lincoln issued his first National Thanksgiving proclamation, and the custom of Presidential Thanksgivings has since been kept up.

The National Thanksgiving day appointed by a Presidential proclamation, is, however, by no means so new an idea as is generally supposed. President Lincoln was only following the example set by President Washington, in the first year of his Presidency. Washington was inaugurated on the 4th of March, 1789. On the third of October of the same year he issued a proclamation for a National Thanksgiving day to be held on *Thursday, Nov. 26, 1789.* That first National Thanksgiving proclamation is worth reproducing here:

WHEREAS, It is the duty of all nations to acknowledge the providence of Almighty God, to obey His will, to be grateful for His benefits, and humbly implore His protection and favor; and, whereas, both Houses of Congress have, by their joint committees, requested me to recommend to the people of the United States a day of public thanksgiving and prayer, to be observed by acknowl-

edging with grateful hearts the many and signal favors of Almighty God, especially by affording them an opportunity of peaceably establishing a form of government for their safety and happiness. Now, therefore, I do recommend and assign Thursday, the twenty-sixth day of November next, to be devoted by the people of these States to the service of the great and glorious Being, who is the beneficent author of all the good that was, that is, that will be.

That we then all unite in rendering unto Him our sincere and humble thanks for His kind care and protection of the people of this country previous to its becoming a nation, for the signal and manifold mercies, and the favorable interposition of His providence in the course and conclusion of the late war; for the great degree of tranquility, union and plenty which we have since enjoyed; for the peaceable and rational manner in which we have been enabled to establish constitutions of government for our safety and happiness, and particularly the national one more lately instituted; for civil and religious liberty with which we are blessed, and the means we have of acquiring and diffusing useful knowledge, and in general for all the great and various favors which He hath been pleased to confer upon us. And also that we may then unite in most humbly offering our prayers and supplications to the great Lord and Ruler of nations, and beseech Him to pardon our national and other transgressions; to enable us all, whether in public or private stations, to perform our several and national duties properly and prudently; to render our national government a blessing to all people, constantly being a government of wise, just and constitutional laws, discreetly and faithfully executed and obeyed; to protect and guide all sovereigns and nations (especially such as have shown kindness unto us), and bless them with good government, peace and concord; to promote the knowledge of true religion and virtue, and the increase of science among us; and generally to grant unto all mankind such a degree of temporal prosperity as He alone knows to be best.

Given under my hand, at the city of New York, the third day of October, in the year of our Lord, one thousand seven hundred and eighty-nine. GEORGE WASHINGTON.

DIDO.

"Cutting a Dido" is a phrase older than most people imagine. The husband of Dido, Princess of Tyre, was Sichæus, priest of Hercules, and that respected gentleman was murdered for his wealth, by Pygmalion, brother to Dido. The widowed Princess was enabled to escape from Tyre, having with her the wealth of her husband, and accompanied by a number of disaffected nobles. After a variety of adventures they landed upon the coast of Africa, where Dido bargained with the natives for as much land as she could inclose in a bull's hide. Selecting a large, tough hide, she caused it to be cut in the smallest possible threads, with which she enclosed a large tract of country, on which the city of Carthage soon began to rise. The natives were bound by the letter of their bargain, and allowed the cunning queen to have her way; and after that, when any one had played off a sharp trick, they said they had "cut a Dido." That was almost three thousand years ago, and the saying has come down to our day.

CELERY AS A NERVINE.

A correspondent of the *Practical Farmer* says: "I have known many men and women too, who, from various causes, had become so much affected with nervousness that when they stretched out their hands they shook like aspen leaves on windy days; and by a daily moderate use of the blanched foot stalks of the celery leaves as a salad, they became as strong and steady in limbs as other people. I have known others so very nervous that the least annoyance put them in a state of agitation, who were in almost constant perplexity and fear, and who were effectually cured by a daily moderate use of blanched celery as a salad at meal times. I have known others cured by using celery for palpitation of the heart.

MUSICAL notes, as used, invented in 1338.

HISTORY AND NATIVITY OF VEGETABLES.

The *Potato*. This plant is supposed to be a native of South America. It was brought to England from Carolina in 1586. When the Spaniards conquered Peru in the sixteenth century, they carried some potatoes to Europe, and sent them to the Pope. The French called them the "Apples of the "Earth." Admiral Drake sent some to a friend to plant, telling him that the fruit would be nutritious and excellent, and very useful in Europe. He actually planted the tubers, and they grew nicely. When the seed balls were ripe, he took these instead of the tubes, and fried them in butter, seasoned them with sugar and cinnamon and placed them before some company as a great rarity. Of course they were disgusting to the taste and the assembly concluded that the fruit would not ripen in Europe. The gardener pulled up the plants and burned them. A gentleman who chanced to be present, stepped upon one of the baked potatoes as it lay in the ashes, when it broke open and he noticed that it was white as snow, and mealy, and had an agreeable smell, that he tasted and found it palatable. The new vegetable was thus rescued, but for a century after it was only cultivated in gardens. In 1600 the queen of England made the remark in her house, that a pound of potatoes cost two shillings, about 50 cents.

The Sweet Potato is believed by some to be of Asiatic origin, or that the American and Asiatic plants are considered as different species. Upon the Antilles it was found as early as 1526. Columbus brought it with other novelties to Europe and presented it to Isabella. C. Clusius mentions that as early as 1601 he had eaten it in Spain.

The *Tomato* is thought to be an American plant. Although cultivated at present in the East Indies, its cultivation there dates only from the discovery of America. It is quite probable that this plant was grown in Mexico at a very early period. It is a Newport, R. I., tradition, that tomatoes were first eaten in this country in about 1823, in a house still standing on the corner of Corne and Mill Streets. There was an eccentric Italian painter, Michele Felice Corne, who bought a stable on the street now called for him, fashioned it into a dwelling house, and there lived and died. He was in the habit of eating "Love Apples" as they were then called, and were thought at that time to be poisonous. They were looked upon as curiosities and prized for their beauty. As a very tempting delicacy some were brought to an invalid, and the attendants were horror-stricken with the thought that she would be poisoned.

The *Turnip*, is derived from a plant growing wild at the present time in Russia and Siberia. The Celts and Germans attempted the cultivation of this plant between the Baltic Sea and the Caucasus, when they were driven to make use of nutritious sorts.

The *Parsnip*, both wild and cultivated is common in the whole of Europe. It has also been known and cultivated in Northwestern France for many centuries, during which time many new varieties have been developed.

The *Onion* was cultivated by the Greeks in particular portions of their gardens. The Island of Cimolus was endowed with the name of Onion Island, because onions of remarkable excellence were cultivated upon it. Herodotus states that in the building of a pyramid in Egypt, the garlic, onions and horse-radish used by the workmen

cost 1,600 talents. It was indigenous from Palestine to India, whence it extended to China, Japan, Europe and North America, and reached America soon after its discovery.

The *Egg-plant* is of Southern Asia and Indian Archipelago. It is of very ancient cultivation although no longer met with there in a wild state. It came by the way of the East to Europe, even in the time of the Romans, and has been distributed over its entire Southern part. It is cultivated at the present day on the western coast of Africa and the Islands of Mauritius, and has become an inhabitant of America since the eighteenth century.

The *Cabbage.* This original plant occurs wild at the present day, on the steep chalk rocks of the sea province of England, and on the coast of Denmark, and of Northwestern France. It is a question whether this plant did not at one time have a much wider distribution when the climatic peculiarities of Europe were different from what they now are. It also found its way into India and China. The young shoots were used in Greece as a dinner dish.

The *Asparagus* is a plant of the seashore and river banks of Southern Europe, and Crimea. It is not found either wild or cultivated in Greece. There are some species belonging to the Mediterranean regions. It is raised very extensively at the present day in North America.

The *Spinach* is native in the regions between Caucasus and the Persian Gulf. Although it was cultivated in Persia and Arabia in the time of the Romans, neither they or the Greeks were acquainted with it. The Dutch Spinach is a variety of the common kind, produced in the course of cultivation.

Lettuce is a variety indigenous to the Southern Caucasus, and the neighboring regions, and thence distributed over the whole of Europe to Altai. The ancient Greeks cultivated two varieties. Lettuce was known to the Persians in the time of Cambyses, and it is now one of the prized dishes of the Greeks. It is now grown in all parts of the world.

The *Celery* is a sea-shore plant occurring on saline soil on the coast of the Mediterranean, in Greece and in Turkey, in its original form and of a bitter taste. It is mentioned by Theophrastus, and seems to have come very early into use. At the present day, the cultivated plant is widely distributed in Greece.

Carrots. It appears that the Greeks and Romans cultivated this plant in their gardens. In grows wild in all Europe, Asia and North America. As early as the seventeenth century, only the white and yellow varieties were known.

The *Radish.* It is probable that China may be considered the native land of this plant, where as in the neighboring Japan, it runs into several varieties, among them an oil plant.

Horse Radish. This plant originated in Southern Russia, and the neighboring countries. Its growth extended from Finland to Astrakan and even to Turkey in Europe.

The *Cauliflower* was cultivated as a culinary vegetable by the Greeks and Romans. Its culture was little attended to in England till the end of the seventeenth century. Soon after it rapidly increased, and prior to the French Revolution, it found an article of export from England to Holland. It is entirely the product of cultivation.

The *Beet.* The original stock of the common, as well as that of the Red Beet, grows wild on the sea shore in

Greece, as also on some of the Canary Islands, in the Atlantic Ocean. It was cultivated for food by the Greeks, as it is at the present day by the Persians and natives of India. The Romans were acquainted with two varieties.

The *Pea.* The culture of the pea goes back to a remote period, and was held in high estimation by the Greeks and Romans. At the present day it is found growing wild upon the hills of the Isthmus of the Crimea, and its native country was probably originally along the coast of the Black Sea.

The *Bean.* Of all the pod fruits, it is thought that the bean has been longest known and most widely distributed. It was cultivated by the Jews and was considered sacred by the Greeks and Romans. A temple dedicated to the God of Beans Kyanetes, stood upon the sacred road to Eleusis, he having first cultivated beans. The Bean Feast which the Athenians celebrated in honor of Apollo, was characterized by the use of beans. The Egyptians considered it an impure fruit, and did not venture to touch it. Pythagoras even forbid his scholars to eat beans. The black speck on the white wings of the flowers, was formerly looked upon as the written character of death, for which the bean in ancient times passed as the symbol of death.

The *Cucumber* belongs originally to the East and Central Asia, and has been used from a very early date, as food for man and animals, although it served the purpose to a limited extent on account of the small amount of nutriment contained in it. Charlemagne ordered that they should be planted on his estates. It found its way to the New World soon after the discovery of America.

The *Pumpkin.* The precise home of this vegetable is not accurately known, but it is thought to be Southern Asia. The Jews cultivated Pumpkins under their kings. They were also known to the Greeks and Romans. After the discovery of America, the plants quickly found their way to the New World so that even New Zealanders were acquainted with them.

The *Squash* is a specie of the gourd or off-shoot of the pumpkin and it is only in the cultivation that has brought it to such perfection. There are many fine varieties in this country as the climate seems to be well adapted for it.

NATIVITY OF FRUITS.

The earliest fruits mentioned in history are the grape, the apple, and the fig, and the former having been cultivated about the time of the deluge. The art of grafting was well known to the ancients. It was not known in the age of Homer, and was probably first practiced not far from the time of Hesoid. It was familiar to the ancient Greeks of a later period. The Dutch made early advancement in the cultivation of fruit and at the close of the sixteenth century they were familiar with the principal kinds of fruit now cultivated. The French also made good progress. In the United States the art and the materials for its practice have been mostly derived from England and to some extent from France and Germany.

The Apple originates from a specie of crabs which grows wild in most parts of Europe. Apples were raised in the gardens of the Phœnicians. The Romans produced numerous kinds, and Pliny also in his time knew of thirty-six varieties. The Siberian Crab is a native of Siberia, but is cultivated in Europe and the United States; the wild

crab is also found in this country but of inferior quality.

The *Pear* was cultivated by the Romans. It was also common in Syria, Egypt and Greece, and from there was transplanted into Italy. It is not a native of North America but was introduced from the other continent. It grows wild in China and Western Asia. Landerer states that the wild pear tree grows in Greece on the driest declivities of the mountains as a small shrub and thorny plant and that the fruit is by no means pleasant.

The *Peach* is a native of Persia and China and its cultivation goes back to the farthest antiquity. The peach is the *Tao* mentioned in the books of Confucius in the tenth century before Christ. It was cultivated in the year 1550 in Britain and was introduced in this country by early settlers about 1580.

The *Plum* originally came from the Caucasus,and the mountains of Talysch. It reached Italy about the time of Cato, and Pliny mentions numerous varieties. They have become naturalized and are produced in this country in great abundance.

The *Apricot* was brought by Alexander the Great, from Armenia to Greece and Epirus, from which countries it reached Italy. It is largely cultivated in Japan, and the mountains west of Pekin are covered with a natural growth of the fruit.

The *Quince* was known in Greece in the earliest times and its fruit dedicated to the Goddess of Love. It is probably native to Northern India and was carried by way of Ispahan and Syria, of Greece. It was esteemed very highly by the Greeks and the Romans. It was brought to Italy from Kydron, a city of the Island of Crete.

The *Cherry* comes originally from Asia. It is said that it was brought into Italy 69 B. C., by the Roman general Lucullus. Pliny says the Romans had eight varieties a hundred years after in cultivation and they were afterwards carried to all parts of Europe. Soon after the settlement of this country the seeds of the cultivated cherry were brought both from England and Holland.

The *Mulberry* was native to and brought at a very early period from North Persia, the Caucasus, Asia Minor to Greece. Theophrastes was aquainted with it. It is only at a late period that this useful tree, after it had been brought by Lucius Vitellus from Syria to Rome, was successfully reared in Italy, after all earlier experiments according to Pliny, had been conducted in vain. It has attained its greatest extent and variety of form in Persia, Northern India and China.

The *Watermelon* is supposed to belong originally to the East and Central Asia. The Egyptians became aquainted with the watermelon during their captivity and for the want of which they bewailed so loudly in the wilderness. They were known to and came with the Arabians to the west.

The *Musk-Melon.* It is quite doubtful which is the native country of this fruit, but is supposed to be a native of Persia. They are cultivated largely in this country as the climate seems to be well adapted for its growth.

THE GRAPE AND SMALL FRUIT.

The Grape, which so long cultivated and naturalized in the middle and southern portions of Europe, is not a native of that continent, but came originally from Persia, where it grows in the highest perfection. As civilization

advanced, the plant followed to Egypt, Greece and Sicily and gradually into Italy. The Romans carried it into Britain about two hundred years after Christ. The seeds and plants were brought to America by the emigrants and colonists soon after the settlement of this country.

The *Gooseberry* is a native of the North of Europe. The meridian of the gooseberry is Lancashire, England. The weavers of Lancashire take a great interest in this fruit where it is raised in its greatest perfection, and they publish a work every year called a Gooseberry book.

The *Raspberry* originated from the bramble cultivated on Mount Ida. It appears to have first been introduced into the gardens of the South of Europe from Mount Ida. The name is probably derived from *(Raspo Italian)* from the rasping roughness of prickley wood. In Scotland it is still called raspis.

The *Strawberry* is a native of Europe, Asia, North and South America; though the species found in different parts of the world are of distinct habit each through cultivation have produced a different class of fruit. The name is understood to have arisen from the ancient practice of laying straw between the plants to keep the fruit clean. Others think the origin of the name comes from the custom of children stringing the berries on straws. It is considered one of the most wholesome of fruits and it is said that Linnæus cured himself of the gout by partaking freely of strawbarries.

The *Blackberry* is of the same specie as the bramble or raspberry. It is cultivated in our gardens at the present day, and is mentioned by Palladius in his time as a garden plant.

The *Elderberry* is a low tree and a native of Europe; several parts of this plant are used in medicine. It is very common in this country.

The *Cranberry* is a native of both this country and Europe. The European is smaller in its growth and produces a fruit of inferior quality. The same may be said of a variety grown in Russia. It is an admitted fact that those grown in this country, are the finest in the world.

The *Rhubarb*, or Pie-plant is a native of Scythia. It is cultivated for its fleshy acid petroles of leaf stalks which are used in early spring as a substitute fruit, for pies etc.

GRAVES OF OUR PRESIDENTS.

The grave of the first and greatest of our Presidents is that which needs the briefest description, so familiar is every American with the scene and story of Mount Vernon. The vault, which was built in obedience to the provisions of Washington's will, is a roomy brick vault, with an arched roof, very simple in design and construction, and so substantial as to promise to endure for another century. On a marble tablet in an arch is the inscription:

Within this Enclosure
rest the Remains of
General George Washington.

Two Presidents, father and son, John and John Quincy Adams, sleep side by side beneath the Unitarian church of Quincy, Mass. The tomb is an apartment in the front part of the cellar, walled in with large blocks of roughly faced granite. A granite slab, seven feet by three, with a huge clasp and padlock, and massive hinges of wrought iron, all red with rust, forms the door. Within, the bodies lay in leaden caskets, placed within cases each hewn from

a single block of stone. The brick furnace for heating the church is close to the door, and the dim and dusty vault, which is rarely visited, serves as a storeroom for light wagons, sleighs, and such property.

Huge, sweeping elms and thrifty horse-chestnuts embower it completely and and give it an air of quiet and retirement, though the daily bustle of business is loud in the streets around it.

Thomas Jefferson's grave is in a thick growth of woods, a few hundred yards to the right of the embowered road leading from Charlotteville, Va., up to Monticello. The spot is as lonesome and solitary as could be desired; the "ancient and venerable oaks" are there, and a single "evergreen," whose murmur alone, and not that of a brook, "breaks the stillness." Its thirty graves are partly enclosed by a brick wall about 100 feet square and ten feet high, which on the south side has tippled over, and now lies in courses of brick and crumbling mortar, level with the ground. The sole inscription is:

Born, April 2. O. S. 1743.
Died, July 4th 1826.

"The region," said a writer describing the home of James Madison, Montpelier, four miles from Orange, Va., "is one where Nature has shed in great beauty the softest picture of hill and dale, forest and glade." Admittance is gained by a small and plain iron gate on the east side, with a plate inscribed "Madison, 1820." Four graves are within the enclosure. Over one of them, a well defined and neatly turfed mound, rising to a height of twenty feet from a pedestal of four pieces, is a slender and graceful granite obelisk, bearing in large, plain, sunken letters near the base, this inscription:

Madison, Born March 16, 1751.

he date of death, June 28, 1836, is not given.

Hollywood cemetery, at Richmond, Va., is indeed, beautiful for situation. Near its extreme southwestern limit, repose the remains of James Monroe. Five feet under ground, in a vault of brick and granite, were placed Monroe's remains. They are covered by a huge block of polished Virginia marble eight feet long and four feet square, on which rests what is called the "sarcophagus", a granite block nearly as large as the pedestal, but wrought into the shape of an ordinary coffin. The body lies from west to east; on the northern side of the "sarcophagus" is a brass plate, now quite black, with this inscription:

James Monroe,
Born in Westmoreland County, 28th April 1758.
Died in the city of New York, 4th July, 1831.

By order of the general Assembly, his remains were removed to this cemetery, 5th July, 1858, as an evidence of the affection of Virginia for her good and Honored son.

Eleven miles from Nashville, on the pretty Lebanon pike, from which a carriage drive between tall spreading cedars conducts, is the Hermitage, a two storied house of brick, with porticos supported by Corinthian pillars. In a corner of the garden, eighty yards from the dwelling lie the great President and his wife, under a massive monument of Tennessee limestone. In the centre of the platform is a pyramid resting on a square; on the left is a stone just over the body of the President, with this inscription:

General Andrew Jackson.
Born March 15, 1767.
Died June 8, 1845.

A granite stone and a few hickory poles, whereon on festival occasions, when her great son ruled the United States, the sleepy village of Kinderhook, in Columbia County, would hang out rejoicing flags—are all that recall to resident or stranger Martin Van Buren. The President's grave is in the centre of the plot; above it rises a plain granite shaft, fifteen feet high, without a particle of carving or ornamentation. About half-way up, upon one face is the following inscription in large black letters:

Martin Van Buren,
8th President of the United States.
Born December 5th, 1782.
Died July 24th 1862.

The ashes of William Henry Harrison, the great whig chieftain and hero of the frontier war, the occupant for only a month of the chair to which he was elevated in a fantastic and picturesque campaign that will never be forgotten, repose, with those of his wife and children, in a plain brick vault on the summit of a hillock at North Bend, Ohio. A flat stone at the height of about two and a half feet from the ground, roofs the brick work of the vault. It does not bear a letter of inscription. But a short time ago it was put in order by Harrison's son, John Scott Harrison, who himself died and was unearthed to serve as a subject in a Cincinnati dissecting room.

Just ten yards east of Monroe's bird cage grave in fair Hollywood Cemetery, Richmond, Va., is a turfed mound.

Not a stone is there to tell that beneath, lies the body of John Tyler.

James Knox Polk died at his home in Nashville on the 15th of June 1849 after a short illness. A few feet from the gate of the Polk Mansion, a white shell path conducts to the tomb of the ex-president. The tendrils of a plant of Kenilworth ivy cling to one of the columns. On the architrave of the east front are engraved these words:

James Knox Polk,
10th President of the United States.
Born November 2, 1795.
Died June 15th 1849.

Zachary Taylor's body now occupies its third grave and soon will find a final restingplace in the fourth. It was first placed in the cemetery at Washington, and thence removed to the Taylor homestead, five miles back of Louisville, Ky., whence a few months ago it was taken to Cane Hill Cemetery, at Louisville. The old family burial ground had in years of neglect gone to complete ruin, the rotten palings had crumbled away or been laid prostrate by storms or breachy cattle, and weeds and rank grass were matted over the sunken mounds, when Taylor's nephew, Richard Taylor, removed the bones of his distinguished relative to Cane Hill, where their present resting-place is indicated by a plain slab of white marble, In the course of time they will be taken to Frankfort, where over them the State will erect an appropriate monument.

Three miles north of Buffalo, where the bright and shallow Scagaquada ripples over its rocky terraces of limestone and through fair groves of oak, beech and maple, is Forest Lawn Cemetery. Almost upon the crest of the hill and near the center of the cemetery rises the obelisk of Scotch granite that marks the resting place of Millard Fill-

more. On the northern face of the obelisk is the following inscription:

Millard Fillmore,
Born January 7th, 1800.
Died March 8, 1874.

After an illness of three months Franklin Pierce died at the residence of Mr. Willard Williams, Concord, N. H., at 2 o'clock on the morning of October 8, 1869. The Pierce lot is at the northwestern corner of the Minot enclosure, which adjoins the Old Cemetery and contains about an acre of level ground. On the plinth is the word "Pierce", in large raised letters, and on the panel of the die this inscription:

Franklin Pierce.
Born November 22, 1804.
Died October 8, 1869.

Buchanan died at Wheatland, Pa., on the 1st of June, 1868. His grave is in Woodward Hill Cemetery, on a bluff in the southeastern part of the city, around which creeps the beautiful Conestoga. On the end of the die facing the main avenue is the word "Buchanan"; on the side facing the chapel is the following inscription:

Here rest the remains of
James Buchanan,
15th President of the United States.
Born in Franklin County Pa.
April 23, 1791.
Died at Wheatland, June 1, 1868.

Lincoln, born in a log hut, is buried under a towering pile of marble, granite and bronze. Oak Ridge Cemetery, a mile and a half north of Springfield, Illinois, contains ninety-seven acres of high, broken land clad with a luxuriant turf and thickly dotted with trees. From the center rises the shaft, 12 feet square at the base and 8 at the top, 89 feet four inches from the ground, with a winding staircase within. Shields of polished granite, bearing the names of the states and linked by two bands of like material, encircle the square three feet below its edge. On the pedestals, at the corners, are heroic groups in bronze, representing the naval and three branches of the military service. Seven feet above them, on the southern side of the shaft, on a pedestal whereon the national coat-of-arms is carved, stands the statue of Lincoln.

In the block below the escutcheon is the inscription in letters of polished granite:

Lincoln.

The monument over Andrew Johnson's grave was unvailed recently.

On the plinth, of marble, 4½ feet square and 3½ feet high, is the inscription, written by Thomas Kinsella, of the Brooklyn Eagle:

Andrew Johnson,
Seventeenth President U. S. A.
Born December 29, 1808.
Died July 31, 1875.
"His faith in the people never wavered".

Thus sleep in death the seventeen Presidents of the United States.

James A. Garfield was assassinated July 2, 1881. Died at Elberon, September 19, 1881. A magnificent monument has been erected by public subscription, in Lake View Cemetery, overlooking the waters of Lake Erie. The tower stands 150 feet high, rising from broad terraces. A spiral staircase leads to top of tower. The remains of the President are inclosed in a crypt below the level of the chamber under the carved tomb.

Chester A. Arthur died suddenly of apoplexy at his residence, No. 123

Lexington avenue, New York, Thursday morning, Nov. 18, 1886. The funeral services were held on the following Monday at the Church of the Heavenly Rest; on the same day a special train conveyed his remains to Albany, where they were placed by the side of his wife, in the family burial place in Rural Cemetery.

Ulysses S. Grant died Thursday, July 23, 1885. The remains were taken to New York, escorted by a detachment of U. S. troops and a body of the G. A. R., composed of veterans of the war. A public funeral was held in that city on Saturday, Aug. 8, which was the most magnificent spectacle of the kind in this country. The body was deposited in a temporary tomb in Riverside Park, overlooking the Hudson river, where it is proposed to erect an imposing monument, for which $125,000 was subscribed up to June, 1887.

GELATINE.

If the skins and membranous tissues of animals are boiled in water, the product, on cooling, becomes a jelly, more or less stiff, according to the quantity and kind of tissues used. Under a treatment but slightly different, the tendons, ligaments, horns, hoofs and bones yield the same material. We give to this product the generic name of Gelatine, but know its impure and coarser forms as Glue, and the finest and purest as Isinglass, which is mainly employed in the preparation of jellies, creams, blanc-mange, and various table delicacies and other purposes, such as the clarifying of liquors, the dressing of silks and other goods.

It is interesting, however, to notice that it is upon this very substance which we extract from the tissues of the animal's skin to make our delicate jellies, that we also depend to make the leather for our shoes. Though itself so soluble, when mixed with tannin it forms an insoluble compound. In the process of leather-making the object is to have the tannic acid contained in the bark soak out the particles of Gelatine contained in the cells of the skin, and turn them into this compound.

There are various methods for preparing gelatine, which is to be sold as an article of food. For the best, the skin of calves' heads, and thick pieces unfit for leather, are used. All the different processes agree in thoroughly cleansing and reducing this to a pulp, which is afterward partially dried, and cut into any convenient form for handling; after which a thorough desiccation, or drying, is secured.

Isinglass is made from the air-bag or swimming-bladder of fishes. That from Russia is reckoned best, and is obtained from a species of sturgeon found in the Black and Caspian Seas and their tributaries. The membrane of its air-bladder is carefully cleaned, dried, and scraped to form isinglass; or, folded into packages, it is called book isinglass; folded into strips and twisted into various forms, it is known as long and short staple. All isinglass undergoes a process of refining before it is employed for making table delicacies.

Isinglass being nearly pure gelatine, and prepared without exposure to great heat, forms a tougher and much firmer cement than glue. Dissolved in water and alcohol, and carefully heated to the boiling point, with a few drops of essential oil to preserve it from moulding, it forms what is known as the "diamond cement." With gum ammoniac introduced, it makes a good cement for mending porcelain, and forms the adhesive substance of court-plaster.

HISTORY OF OUR GOVERNMENT COINS.

As there are many facts concerning our government coinage of Gold, Silver, and Copper, which the majority of people know very little about, great pains have been taken to give the facts and value as near as can be ascertained. Where there has been any conflict about the coinage of certain dates, between statistics, purporting to be compiled from Mint reports, and the catalogue of coin dealers, the correct information was received direct from the Sup't of the Mint. Many persons have an idea that any old date of silver or copper coins are very valuable. There are very few of each denomination that are considered rare, and while some particular dates even if in fair or poor condition are in great demand by coin collectors; the majority of coins must be in good condition to be of any great value.

The coinage of Gold commenced with the Eagle in 1793 and continued to 1804 inclusive. There were none coined from that date until 1838, since then they have been coined each year to the present time.

Half Eagles were coined in 1793 to the present time with,the exception of the years of 1816—1817.

Quarter Eagles were coined in 1796 and continued to the present time excepting the years of 1800, 1801, 1809 to 1820 inclusive, also 1822—1823 and 1828.

The Gold dollar was next in order and was first coined in 1849 and each year to and including 1876. A small number of each year since have been coined for proofs but not for general use.

Double Eagles twenty dollars were coined first in 1850 and each succeeding year to the present time.

The fifty dollar gold piece was not coined by authority of the government, but was issued by private parties in California between 1851—1855 and 1856.

The three dollar gold piece was the next in order and was first coined in the year 1854 and for each year to the present time. Very few however were coined during the years of 1863—1873 and 1875.

Silver dollars were coined in 1794 and to 1804 inclusive. None were coined for the next thirty-four years from 1805 to 1839 inclusive, with the exception of a few in 1836—1839. Since that time the coinage has continued to the present time. The Trade dollar was coined in 1873—74, 75, 76, 77, 78. Standard dollar in 1878—79. The dollars of 1798 were only pattern pieces and not of the regular coinage. The most valuable of the whole issue is of the date of 1804 which is worth from five hundred dollars upwards according to the condition of the coin. There are many other dates rare and scarce including 1794—98, 1836—39, 51, 52, 54, 55 and 58 which if the dates are plain and are perfect otherwise will command a price much above their face value.

Half dollars were coined in 1793 and to the present time except the years 1798—99, 1800 and 1816. Rare dates are 1794—96, 97, 1801—02, 15, and 36 with reeded edge, and 1851—52.

Quarter dollars were first coined in 1796 and for each year to the present time with the exception of 1798—99, 1803—08, 09, 10, 11, 12, 13, 14, 17, 26, 29 and 1830. The rare dates are 1796—1804, 23, 27, and 1853 without arrows.

The twenty cent piece was coined from 1875 to 1878 and then was discontinued by act of Congress.

Dimes were first coined in 1796 and each year to the present time excepting the years of 1799—1806, 08, 12, 13, 15, 16, 17, 18, 19 and 1826. The rare date of the collection is 1804. The dates of 1796 to and including 1811 are scarce; also 1822—24, 46 and 1873 without arrows.

Half Dimes were coined in 1793 to 1873 excepting the dates of 1798—99, 1804 and 1806 to 1828 inclusive. Since 1873 the coinage has been discontinued by act of Congress. The date of 1802 is extremely rare; very few specimens are known. The other dates which are scarce are 1794—96, 1801, 03, 05, 40 and 1846.

The Silver three cent piece was first coined in 1851 and continued each year to 1873. The coinage has been discontinued since that time by act of Congress. There are only the dates of 1855 and 1873 that are considered rare.

Nickle five cents were first coined in 1866 and each succeeding year to the present time. The date of 1868 with rays is scarce.

Nickle three cents were first coined in 1865 and each year to the present time.

Two cents, the coinage commenced in 1864. They were coined each year to and including 1873. Since then by act of Congress the coinage has been discontinued.

Copper cents were coined in 1793 and for each year excepting 1815 to 1857 which was discontinued at that time. During that year and 1858 the small Nickle cent with flying Eagle was coined. There were also a very few of the same style in 1856, but they are very rare and command a good price. From 1859 to 1864 small Nickle cents were coined but not of the eagle pattern, during that year the Bronze cent was coined and for each year to the present time. The rare date of the collection is 1799 and 1804, also some varieties of 1793 and 1809 are valuable. While any of the dates are worth more than their face value, those mentioned are considered by coin collectors hard to get in good condition.

Half cents. The coinage of half cent commenced in 1793 and continued to 1835 except the years of 1798—99, 1801—1812 to 1824 inclusive 1827 and 1830. A very few were coined in 1836. Although the dies were cut there were none issued from 1837 to 1848 inclusive and 1849 small date. In later years a limited number of pieces were struck from these dies dated 1836—40 to 48 inclusive and 1849 small date, and since then to 1857 when the coinage was discontinued by act of Congress. Neither the records of the Mint or the statement of coinage in the Report of the Director of the Mint for 1873 mention any coinage of Half cents for those years. It is possible they were struck without any authority. The rare dates are 1793—94, 97, 1800—02, 10 and 1811.

There have also been coined a large number of pattern or experimental pieces which have never been in circulation. Also many coins issued by private parties, but without any authority of our government.

THE LARGEST WHEAT FARM IN THE WORLD.

The largest cultivated wheat farm on the globe is said to be the Grandin farm, not far from the town of Fargo, Dakota. It embraces some 40,000 acres, both Government and railway land, and lies close to the Red River. Divided into four parts, it has granaries, machine shop, elevators, stables for 200 horses, and room for storing one

million bushels of grain. Besides the wheat farm there is a stock farm of 20,000 acres. In seeding time 70 to 80 men are employed and during harvest 250 to 300 men. Seeding begins about April 9th and continues through the month, and is done very systematically, the machines following one another around the field some four rods apart. Cutting begins August 8th, and ends early in September, succeeded by the threshing with eight steam threshers. After threshing the stubble ground is plowed with great plows, drawn by three horses, and cutting three furrows; and this goes on until the weather is cold enough to freeze, usually about November 1st. There are many other large farms in the Territory and in the same neighborhood, and they are tilled in much the same manner as the Grandin. The surface of the land generally is almost level, and the soil rich and black. The product of one field of 2,315 acres is 57,285 bushels—elevator weight—some 25 bushels to the acre. The average yield of the Dakota wheat farm is from 20 to 25 bushels per acre, and the concurrent testimony is that it is unequalled as a wheat region in the world.

THE LARGEST ORCHARD IN THE WORLD.

The largest orchard in the world is doubtless that owned and worked very successfully by Mr. Robert McKinstry, of Hudson, Columbia Co., N. Y. The orchard is situated on the east bank of the Hudson River, on high, rolling table land, and contains more than 24,000 apple trees, 1,700 pears, 4,000 cherries, 500 peaches, 200 plums, 200 crabs, 1,600 vines, 600 currants, and 200 chestnuts. The varieties grown are: Rhode Island Greening, 7,000; Baldwins, 6,000; King of Thompson County, 5,000; Astrachans, 800; Northern Spy, 500; Wagener, 500; Gravenstein, 400; Cranberry Pippins, 200; Ben Davis, 200; Duchess of Oldenberg, 200; with Jonathans, Hubbardstones, Cayugas, Vanderveers, Bellflowers, Pearmains, Peck's Pleasant, Twenty-ounce Pippins, Russetts, and others in less number. The pears are Bartlett, B. d'Anjou, Sheldon, Seckel, and Lawrence, chiefly. Of cherries there are twenty-eight varieties. The orchard is remarkable, thrifty, and the oldest trees are about twenty years old. The soil is dry, rolling gravel, with some limestone; the trees are planted twenty feet apart, and do not seem by any means to be crowded. The ground is plowed several times in the year and kept fallow, excepting when thought advisable, it is seeded to clover. The orchard is intersected by roads over six miles in length for the passage of wagons, and bounded by a continuous row of apple trees set ten feet apart for four and a half miles. The apple crop of the past year was 30,000 barrels.

THE SAND BLAST.

Among the wonderful and useful inventions of the times is the common sand blast. Suppose you desire a piece of marble for a grave-stone; you cover the stone with a sheet of wax no thicker than a wafer, then cut in the wax the name, date, etc., leaving the marble exposed. Now pass it under the blast and the wax will not be injured at all, but the sand will cut letters deep into the stone.

Or, if you desire raised letters, a flower or other emblem, cut the letters, flowers, etc., in wax and stick them upon the stone, then pass the stone under the blast and the sand will cut

it away. Remove the wax and you will have raised letters.

Take a piece of French plate glass, say two feet by six, and cover it with fine lace; pass it under the blast, and not a thread of the lace will be injured, but the sand will cut deep into the glass wherever it is not covered by the lace. Now remove the lace and you have every delicate and beautiful figure raised upon the glass.

In this way beautiful figures of all kinds are cut at a small expense. The workmen can hold their hands under the stone, but they must look out for finger nails, for they will be whittled off right hastily.

If they put on steel thimbles to protect the nails, it will do little good, for the sand will soon cutthem away; but if they wrap a piece of cotton cloth around them they are safe. You will at once see the philosophy of it. The sand whittles away and destroys any hard substance, even glass, but does not affect substances that are soft and yielding like wax, cotton or fine lace, or even the human hand.

ETHER.

Ether is properly the name of a class of substances rather than that of an individual article. We have sulphuric ether, acetic ether, benzoic ether, and many others, whose names depend on their composition or peculiar manner of production. The term itself is a Greek word, which means the "upper air," in which sense we also use it. But it is also applied to these substances on account of their extreme lightness, and consequent liability to rise in vapor. Most of them are inflammable, possess a sweetish taste, and have many other properties which are very sinilar in all. They are made by distilling alcohol with the different acids; sulphuric, nitric, acetic, benzoic, and others, as the case may be. Yet the product of this distillation with sulphuric acid—or sulphuric ether—is so much more common than any of the others, and is applied to so many more purposes, that by universal consent it has become known by the simple name of ether. This is the variety always meant when no other is specified. It has long been known, though only within a very few years has it been put to some of its most important uses.

Analysis shows the elements of sulphuric ether to be very similar to those of alcohol. It contains no sulphuric acid, though this entered so largely into the mixture from which it was distilled. The composition of the ether is four parts of carbon, five of hydrogen, and one of oxygen. The composition of alcohol is four parts of carbon, six of hydrogen, and two of oxygen. In reality, therefore, only a single atom each of oxygen and hydrogen (the two constituents of water) are taken away from alcohol to make it ether.

Ether is one of the important articles in every chemical laboratory. It has also many uses in the arts. Evaporating so rapidly it readily produces cold, and this becomes intense if the evaporation is long continued. Yet the ether does not freeze, even at so low a temperature as a hundred and sixty below zero. The chief use of ether, however, is in medicine and surgery where it is much relied on for several important purposes. It is both a narcotic and a stimulant, according as it is differently used. In surgery it has within a few years, as is well known, been very generally employed to produce insensibility, so that difficult operations can be performed without pain to the patient.

There has been much controversy as

to whom belongs the honor of first suggesting the use of this agent in surgical practice. By proper management a continuous insensibility to pain may be kept up, by causing the patient to inhale the vapor; hence its use in surgical parctice. It was first publicly employed in the Massachusetts General Hospital in Boston, October 16, 1845, at the request of Dr. W. T. G. Morton, of that city, who had previously employed it in his dental practice. Such was the success of this experiment that Dr. Morton within less than a month proceeded to secure a patent for its use in the United States, designating it by the name of "Letheon." But soon after Dr. Charles T. Jackson put in the claim of having suggested its use to Dr. Morton, upon which a long dispute ensued, public opinon being much divided as to the merits of the case which each claimant presented. The Academy of Sciences in Paris divided its honor between the two by awarding a prize of twenty-five hundred francs to Dr. Jackson for his "observations and experiments," and an equal amount to Dr. Morton for "introducing the ether into practice after the indications of Dr. Jackson." A bill, it may be remembered, was, at one time, introduced into the Senate of the United States to purchase the patent of Dr. Morton for a hundred thousand dollars. This, however, was opposed, not only on the ground of the claim of Dr. Jackson, but also that of the widow of Dr. Horace Wells, of Hartford, Conn., who asserted a previous discovery of the same thing in behalf of her husband. None of the claimants gained this prize, though all agree that no money could compensate for the suffering which this discovery, by whomsoever made, has saved.

MONEY.

The word "money" is from *moneta*, because in Rome coin was first regularly struck in the temple of June Moneta, which again was derived from *monere*, to warm, because it was built on the spot where Manlius heard the Gauls approaching to the attack of the city. "Coin" is probably from the Latin *cuneus*, a die or stamp. Many coins are merely so called from their weight, as for instance one pound, the French livre, Italian lira; other from the metal, as the "aureus"; the "rupee" from the Sanskrit "runva," silver; others from the design, as the angel, the testoon, from *teste* or *tete*, a head; others from the head of the state, as the sovereign, crown; others from the proper name of the monarch, such as the daric, from Darius, the Philip, Louis d'or, or the Napoleon. The doliar or thaler is short for the Joachimstaler, or money of the Joachims Valley, in Bohemia, where these coins were first struck in the sixteenth century. Guineas were called after the country from which the gold was obtained, and the "franc" is an abbreviation of the inscription *Francorum Rex.* The "sou" is from the Latin *solidus.* The word shilling appears to be derived from a root signifying to divide; and in several cases the name indicates the fraction of some larger coin, as the denarius, half-penny, farthing, cent, and mill. The pound was originally not a coin, but a weight, and comes from the Latin *pondus.* Our pound was originally a pound of silver, which was divided into two hundred and twenty pennies. The origin of the word penny is unknown. Some have derived it from *pende*, to weigh; but this does not seem very satisfactory. Our word "sterling" is said to go back to the time of the Conquest, but the

derivation has been much disputed. Some have supposed that it was first attributed to coins struck at Stirling, but for this there is not the slightest evidence; others, that the name was derived from coins having a star on the obverse, but no coins which could have given rise to such a name are known. The most probable suggestion is that it has reference to the Easterling, or North German merchants.

ACKNOWLEDGE THE CORN.

The phrase "Acknowledge the corn," is variously accounted for, but the following is a true history of its origin:—In 1828, Andrew Stuart, a member of Congress, said in a speech, that Ohio Kentucky and Indiana sent their hay stacks, corn fields and fodder to New York and Philalelphia for sale. Wickliffe, of Kentucky, called him to order, declaring those States did not send hay stacks or corn fields to New York for sale. "Well, what do you send?" asked Stewart. "Why, horses, mules, cattle and hogs." "Well, what makes your horses, mules, cattle and hogs?" You feed $100 worth of hay to a horse. You just animate and get upon the top of your haystack and ride off to market. How is it with your cattle? You make one of them carry $50 worth of hay and grass to the Eastern market. How much corn does it take at thirty-three cents a bushel to fatten a hog?" "Why, thirty bushels." "Then you put that thirty bushels into the shape of a hog, and make it walk off to the Eastern market." Then Mr. Wickliffe jumped up and said—"Mr. Speaker, I acknowledge the corn."

PRINTING invented at Mentz by Gutenberg in 1450.

STARCH.

Starch and cotton goods originated in the East. The institutes of Menn, 800 B. C., refer to the stiffening action of starch. Plinny informs us that starch was prepared from wheat by the inhabitants of Chio. The method of starching linen was publicly taught in England in the year 1560 by a Dutch woman, a Mrs. Dingham, the wife of Queen Elizabeth's coachman.

Starch is found in the cells of all plants except fungi, in the form of minute granules. In England wheat is generally used for making starch. In this country corn and potatoes are very generally used, the potatoes are prepared by thoroughly washing and then crushing in clear cold water; the resulting starchy matter flows in the vats beneath, where it is allowed to settle, and is afterwards washed one or more times, dried in stoves and packed; the refuse of the potatoes, the pumace and skins, being carried off by a current of water. The application of maize to the purpose was patented by James Coleman in 1841, and was successfully practiced in the ensuing year at Oswego, N. Y., by Thomas Kingsford. The Kingsfords at present have probably the largest starch factory in the world having bins five stories in depth, capable of holding 2,000,000 bushels of corn and turning out annually some 5,000 tons of starch. From the bins the grain is passed through fanning-mills, which removes impurities, and is then conducted to large vats, where it is macerated and softened to facilitate the seperation of the albumen and gluten.

After this process it is ground and pulped by a series of burr stones and

iron rollers, and is next transfered to drums or sieves, where the starch is washed and by the action of water, the non-farinaceous portion remaining within the sieves to escape through openings at their ends and conducted away to receptacles, whence it is taken and used as food for cattle. The starch is received in vats where it is agitated by means ot stirrers operated by water or steam power, and is supplied with water and chemicals to purefy it. Where the superfluous water has been partially withdrawn and it is in a semi-fluid state, it is run into moulds, where it settles into solid cakes, which are broken into square cakes, these are placed in a kiln and dried at a low heat, and the cakes are scraped to remove impurities which appear as a yellow crust on the surface. They are now again dried, causing them to fall into little pieces, which assume the peculiar forms so well known. The highest grades, as corn-starch for puddings, or *maizina*, being ground fine, measured, and automatically put up and pressed in the packages by an arrangement of devices which prevent aud obviate the production of dust. There are various forms used, but the general principles of all beiug similar.

SALT.

Salt is a substance used for seasoning, being the chloride of sodium, and generally known as *common salt.* It is obtained by evaporation from the waters of the sea, or saline lakes or springs, and from the earth in a chrystalized state, or in the form of *rock salt.*

Mankind in all ages appear to have had a relish for salt. " Can that which is unsavory be eaten without salt? or is there any taste in the white of an egg?" Job, VI,6. Salt among the ancients was the emblem of friendship and fidelity, also of the inviobility of compacts, hence it was used in all their sacrifices and covenants. The Bedouin Arabs consider it in the same light; they have great respect for bread and salt, and are accustomed to affirm or deny anything by these substances. Hostile as they generally are toward strangers, yet if they have eaten salt with anyone, it would be accounted the greatest of all crimes to rob him. The Romans received their pay in *salarium* or salt-money. The Mexican rulers interdicted the use of salt in their rebellious provinces. The early Greek theology dispensed with the use of salt in all their sacrificial ceremonies, but the Jewish dispensation enforced its use theirin. Some people such as those of Eperios never knew the use of salt The aborignal Bathoist tribe in the Anstralia cannot be tempted by love or money even to taste it. Nearly seventeen centuries ago spilling salt was regarded as unlucky, but it does not appear to have ever been accounted for or reasonably guessed at. It is said that the first salt produced in this country by solar evaporation was made by Thomas Howes, John Sears, and others at Dennis, Mass. in the year 1776. The largest and most extensive salt works in this eountry are at Syracuse, New York and Saginaw, Mich.

THE NAMES OF THE MONTHS.

January, so called from Janus, a heathen god, who presided over the gates of heaven. He has two faces, one looking to the old year, the other towards the new. He was the first king of Italy, and Romans used to give the doors in their houses the name of Janua. February is derived from Februo,

to purify, because the feasts of purification were celebrated at this season. The Romans offered sacrifices to their goddess Februo for the spirits of departed friends. March was orginally the first month in the Roman year, and was dedicated to Mars, the god of war. April is so called from aperio, which signifies to open, because nature now begins to expand its beauties. May was so named by Romulus, the founder of Rome, in honor of Maia, the Mother of Mercury. June, named by the Romans in honor of Mercury, who was represented as a juvenile figure, to which they applied the word Junins. July was called by the Romans Quintills, being the fifth month of their year, bnt was changed to Julius, in honor of Julius Cæsar. August was called by the Romans Sextis, or sixth month from March; but in honor of Augustus Cæsar, second emperor, was changed to August. September was derived from Septem, the seventh month of the Roman year, and imber, which means a shower. October was the eighth month of the Roman year. November is derived from novem and imber, or the ninth month of the Roman year. And December from decem, the tenth month of the Roman year.

ACCIDENTAL DISCOVERIES.

Valuable discoveries have been made, and many inventions suggested, by the veriest accidents.

An alchemist, while seeking to discover a mixture of earths that would make the most durable crucibles, one day found that he had made porcelain.

The power of lenses, as applied to the telescope, was discovered by a watchmaker's apprentice. While holding spectacle-glasses between his thumb and finger, he was startled at the suddenly-enlarged appearance of a neighboring church-spire.

The art of etching upon glass was discovered by a Nuremberg glass-cutter. By accident, a few drops of aqua fortis fell upon his spectacles. He noticed that the glass became corroded and softened where the acid had touched it. That was hint enough. He drew figures upon the glass with varnish, applied the corroding fluid, then cut away the glass around the drawing. When the varnish was removed, the figures appeared raised upon a dark ground.

Mezzotinto owed its invention to the simple accident of the gun-barrel of a sentry becoming rusted with dew.

The swaying to and fro of a chandelier in a cathedral suggested to Galileo the application of the pendulum.

The art of lithographing was perfected through suggestions made by accident. A poor musican was curious to know whether music could not be etched upon stone as well as upon copper.

After he had prepared his slab, his mother asked him to make a memorandum of such clothes as she proposed to send away to be washed. Not having pen, ink and paper convenient, he wrote the list on the stone with the etching preparation, intending to make a copy of it at leisure.

A few days later, when about to clean athe stone, he wondered what effect aqu fortis would have upon it. He applied the acid, and in a few minutes saw the writing standing out in relief. The next step necessary was simply to ink the stone and take off an impression.

The composition of which printing-rollers are made was discovered by a Solopian printer. Not being able to find the pelt-ball, he inked the type with a piece of soft glue which had

fallen out of a glue-pot. It was such an excellent substistute that, after mixing molasses with the glue, to give the mass a proper consistency, the old pelt-ball was entirely discarded.

The shop of a Dublin tobacconist, by the name of Lundyfoot, was destroyed by fire. While he was gazing dolefully into the smouldering ruins, he noticed that his poorer neighbors were gathering the snuff from the canisters. He tested the snuff for himself, and discovered that the fire had largely improved its pungency and aroma.

It was a hint worth profiting by. He secured another shop, built a lot of ovens, subjected the snuff to a heating process, gave the brand a particular name, and in a few years became rich through an accident which he at first thought had completely ruined him.

The process of whitening sugar was discovered in a curious way. A hen that had gone through a clay puddle went with her muddy feet into a sugar-house. It was noticed that wherever her tracks were the sugar was whitened. Experiments were instituted, and the result was that wet clay came to be used in refining sugar.

The origin of bluetinted paper came about by a mere slip of the hand.

The wife of William East, an English paper-maker, accidently let a blue bag fall into one of the vats of pulp. The workmen were astonished when they saw the peculiar color of the paper, while Mr. East was highly incensed over what he considered a grave pecuniary loss. His wife was so much frightened that she would not confess her agency in the matter.

After storing the damaged paper for four years, Mr. East sent it to his agent at London, with instructions to sell it for what it would bring. The paper was accepted as a "purposed novelty," and was disposed of at quite an advance over market price.

Mr. East was astonished at receiving an order from his agent for another large invoice of the paper. He was without the secret, and found himself in a dilemma. Upon mentioning it to his wife, she told him about the accident. He kept the secret, and the demand for the novel tint far exceeded his ability to supply it.

A Brighton stationer took a fancy for dressing his show-window with piles of writing-paper, rising gradually from the largest to the smallest size in use; and, to finish his pyramids off nicely, he cut cards to bring them to a point.

Taking these cards for diminutive note-paper, lady customers were continually wanting some of "that lovely little paper", and the stationer found it advantageous to cut paper to this size.

As there was no space for adressing the notelets after they were folded, he, after much thought, invented the envelope, which he cut by the aid of metal plates made for the purpose.

The sale increased so rapidly that he was unable to produce the envelopes fast enough, so he commissioned a dozen houses to make them for him, and thus set going an important branch of the manufacturing stationary trade.

GLUCOSE AND GRAPE SUGAR.

The manufacture of syrup and sugar from corn starch is an industry which in this country, is scarcely a dozen years old, and yet it is one of no inconsiderable magnitude. Prof. Wiley in Popular Science Monthly says: On August 1, 1880, ten glucose factories were in operation in the United States, consuming daily about twenty thousand bushels of corn.

To avoid confusion of ideas, the following statement seems necessary. The word Glucose, in this country, is employed among dealers to designate exclusively the thick syrup which is made from corn starch. On the other hand, grape sugar is applied to the solid product obtained from the same source. The glucose and grape syrup of the trade have optical and chemical properties quite different from many other substances bearing the same name. I shall use the words in the signification explained above.

Glucose is a thick, tenacious syrup, almost colorless, or of a yellowish tint. It has an average specific gravity, at 20° C., of 1·412. That which is made for Summer consumption is a little denser than that manufactured for Winter use. This syrup is so thick that, in the Winter, it is quite difficult to pour it from one vessel to another.

The sweetness of glucose—*i. e.* the intensity of the impression it makes on the nerves of taste — varies greatly with different specimens. Some kinds approach in intensity the sweetness of cane sugar, while others seem to act slowly and feebly. It has been shown that the degree of sweetness depends on the extent of the chemical changes which go on in the conversion of starch into sugar. When the progress of conversion is stopped, as soon as the starch has disappeared, the resulting glucose has a maximum sweetness. The color of glucose depends on the thorough washing of the substance, during the process of manufacture, through animal charcoal, and lowness of temperature at which it is evaporated, and rapidity of evaporation.

There is one variety of glucose which is made for confectioner's use, which is much thicker and denser than that just described. Its specific gravity may reach 1·440, but it has no tendency to become hard and solid, like the so-called grape sugar.

The grape sugar made from corn starch, when well made, is pure white in color when first made, but has a tendency to assume a yellowish tint when old.

Glucose is used chiefly for the manufacture of table syrups, candies, as food for bees, for brewing, and for artificial honey.

All soft candies, waxes, and a large proportion of stick candies and caramels, are made of glucose.

A very large percentage of all the glucose made is used for the manufacture of table syrup. The process of manufacture is a very simple one:

The glucose is mixed with some kind of cane syrup until the tint reaches a certain standard. The amount of cane sugar syrup required varies from three to ten per cent, according to circumstances. These syrups are graded A, B, C, etc., the tint growing deeper with each succeeding letter.

I shall attempt here no detailed statement of the method of manufacture, but give only such an outline as may interest those, who like to know how the things on their table are prepared. The corn is first soaked for two or three days in warm water, and is then ground on specially prepared stones with a stream of water. The meal is next passed into a trough, the bottom of which is made of fine bolting cloth. Here the starch is washed through, and led to large tanks, where it is allowed to settle. It is next beaten up with caustic soda to separate the gluten, and the starch is again allowed

to settle in long, shallow troughs. The starch, washed from all adhering alkali, the next beaten up with water into cream, and conducted into the converting tubs. These tubs are supplied with coils of copper steam piping and are made of wood. Here the starch cream is treated with dilute sulphuric acid, and steam is allowed to bubble up through the mixture from small holes in the copper pipes. This process of conversion, which is called "open conversion," is completed in about two hours.

Another method is called "close conversion." The greater part of it however is carried on by the method first named.

After conversion the acid is neutralized by marble dust and animal charcoal. Since the sulphate of calcium, which is formed in this operation, is slightly soluble in water, carbonate of barium has been used instead of marble dust. Its use, however, has not become general.

After neutralization the liquid is filtered through cloth and animal charcoal, and is then conveyed to the vacuum pan. Here it is evaporated, at as low a temperature as possible, to the required concentration. If grape sugar is to be made, the process of conversion is not stopped as soon as the starch has disappeared, but is carried on still further to a point which can only be determined by trial. After concentration it is conveyed into tanks, where the progress of solidification begins and continues for several days.

Glucose, on the other hand, will not harden, whatever the degree of concentration may be, or, at least, if it do so, only partially and after many months.

Glucose and grape sugar are mixtures of several chemical substances. Starch, which is composed of six atoms of carbon, ten of hydrogen, and five of oxygen, when subjected to the action of dilute sulphuric acid, appears to undergo a molecular condensation and hydration. Among the substances formed may be reckoned dextrine, glucose, and a substance isomeric with cane sugar.

The question of most practical importance is, "Is glucose a wholesome article of food?" I do not hesitate to answer this question in the affirmative. I mean by this, however, a glucose which is properly made. Such a glucose contains only a very little sulphuric acid and lime, not much more than good Spring-water, and perhaps an almost infinitesimal trace of copper, so slight as only to be detected in a large quantity of the substance.

There is no reason to believe that a glucose or grape sugar properly manufactured, is any less wholesome than cane or maple sugar.

DISTANCES AROUND THE WORLD.

	MILES.
New York to San Francisco....	3,450
San Francisco to Yokahoma....	4,764
Yokahoma to Hong Kong.....	1,620
Hong Kong to Singapore	1,150
Singapore to Calcutta.....	1,200
Calcutta to Bombay.....,	1,409
Bombay to Aden.....	1,664
Aden to Suez.....	1,308
Suez to Alexandria.....	250
Alexandria to Marseilles.....	1,300
Marseilles to Paris.....	536
Paris to London.....	316
London to Liverpool.....	205
Liverpool to New York.....	3,000
Total.....	22,172

CAPACITY OF CISTERNS OR WELLS.

Tabular view of the number of gallons contained in the clear, between the brick work, for each ten inches of depth.

Dia.		Gal.	Dia.		Gal.
2	feet equal	19	8	feet equal	313
2½	"	30	8½	"	353
3	"	44	9	"	396
3½	"	60	9½	"	443
4	"	78	10	"	498
4½	"	99	11	"	592
5	"	122	12	"	705
5½	"	148	13	"	827
6	"	176	14	"	958
6½	"	207	15	"	1,101
7	"	240	20	"	1,958
7½	"	275	25	"	3,059

THE DIMENSIONS OF BOXES.

A box 24 by 16 inches square and 28 inches deep, will contain a barrel (five bushels).

A box 24 by 16 inches square and 14 inches deep, will contain half a barrel.

A box 26 by 15½ inches square and 8 inches deep, will contain a bushel.

A box 12 by 11½ inches square and 8 inches deep, will contain half a bushel.

A box 8 by 8½ inches square and 8 inches deep, will contain one peck.

A box 3 by 8 inches square and 4½ inches deep, will contain one gallon.

A box 4 by 8 inches square and 4½ inches deep, will contain half a gallon.

A box 4 by 4 inches square and 4½ inches deep, will contain a quart.

THE CLIMATES OF THE UNITED STATES.

A table prepared by selection from the voluminous records of the recent work on American temperature showing the mean annual temperature of the atmosphere at a given point in each of the forty-nine States and Territories of the Union. The place selected is either the capitol or some leading city or town where observations have been most continuously kept.

State or Territory.	Place of Observation.	Mean annual temperature.
Alabama.....	Mobile.....	66 deg.
Alaska.....	Sitka.....	46 deg.
Arizona.....	Tuscon.....	69 deg.
Arkansa.s.....	Little Rock....	63 deg.
California.....	San Francisco.	55 deg.
Colorado.....	Denver.....	48 deg.
Connecticut...	Hartford.....	50 deg.
Dakota.....	Fort Randall..	47 deg.
Delaware	Wilmington...	43 deg.
Dist. Columbia.	Washington...	55 deg.
Florida.....	Jacksonville...	69 deg.
Georgia	Atlanta	58 deg.
Idaho	Fort Boise	52 deg.
Illinois	Springfield....	50 deg.
Indiana.....	Indianapolis...	51 deg.
Ind. Territory.	Fort Gibson...	60 deg.
Iowa.....	Des Moines ...	49 deg.
Kansas	Leavenworth..	51 deg.
Kentucky.....	Louisville.....	56 deg.
Louisana.....	New Orleans ..	69 deg.
Maine.....	Augusta.....	45 deg.
Maryland.....	Baltimore.....	54 deg.
Massachusetts .	Boston	48 deg.
Michigan.....	Detroit.....	47 deg.
Minnesota	St. Paul	42 deg.
Mississippi	Jackson.....	64 deg.
Missouri.....	St. Louis.....	55 deg.
Montana.....	Helena	43 deg.
Nebraska	Omaha	49 deg.
Nevada.....	Winfield Scott.	50 deg.
N. Hampshire.	Concord	46 deg.
New Jersey...	Trenton	53 deg.
New Mexico...	Santa Fe.....	51 deg.
New York	Albany.....	48 deg.
North Carolina.	Raleigh.....	50 deg.
Ohio	Columbus.....	53 deg.
Oregon.....	Portland.....	53 deg.
Pennsylvania..	Harrisburg....	54 deg.
Rhode Island..	Providence.....	48 deg.
South Carolina.	Columbia.....	62 deg.
Tennessee.....	Nashville	58 deg.
Texas	Austin.....	67 deg.
Utah.....	Salt Lake City.	52 deg.
Vermont.....	Montpelier	43 deg.
Virginia.....	Richmond.....	57 deg.
Wash. Ter....	Steiacoon.....	51 deg.
West Virginia.	Romaney	52 deg.
Wisconsin	Madison.....	45 deg.
Wyoming,....	Fort Bridger ..	41 deg.

THE RELIGION OF OUR FOREFATHERS.

The different religions or forms of worship in Boston from 1630 to 1842 are taken from the records showing in regular order the year in which the denominations were first represented, where and by whom, and the number of ministers during that period.

CONGREGATIONALIST.

John Wilson, graduated at Cambridge, Eng. and came to New England in 1630, settled First Church Nov. 22, 1630.

BAPTIST.

Thomas Gould, Baptist, settled First Baptist Church 1665.

EPISCOPAL.

Robert Ratcliffe, Episcopal, graduated in Eng. settled Kings Chapel, June 15, 1686.

FIRST PROTESTANT.

Peter Daille settled School St. Church in 1687.

PRESBYTERIAN.

John Morehead graduated, Scotland, settled Federal St. Church March 31, 1730.

UNIVERSALIST.

John Murray graduated in England, settled First Universalist Church Oct. 24, 1773.

UNITARIAN.

James Freeman Unitarian, Graduated at Harvard College 1777, settled Kings Chapel Oct.18, 1782.

CATHOLIC.

Claudius Florent Bouchard de La Poterie, Catholic. settled the Church of the Holy Cross, 1784.

METHODIST.

Jesse Lee, Methodist, settled First Methodist Church 1790.

CHRISTIAN.

Simon Clough, Christian, settled First Christian Church 1819.

NEW JERUSALEM.

Thomas Worcester, New Jerusalem, Graduated at Harvard College 1818, settled New Jerusalem Church Aug. 17, 1828.

EVANGELICAL PROTESTANT.

Henry Emanuel Smith, Evangelical Protestant, settled the German E. P. Church May, 13, 1836.

GERMAN LUTHERAN.

George M. Merz, Lutheran, Graduated in Germany, settled German E. L. Church Oct. 28, 1838.

FREE WILL BAPTIST.

Jonas Welch Holman, F.W. Baptist, settled First F. W. Baptist Church July, 1839.

During the time of over two hundred years there were settled in Boston 330, Ministers divided as follows: Congregational 120, Methodist 80, Episcopal 41, Baptist 39, Catholic 22, Universalist 6, Christian 3, First Protestant 2, Evangelical Protestant 2, Lutheran 2, New Jerusalem 1, Free Will Baptist 1.

CRAPE.

This is a thin fabric made of raw silk which has been tightly twisted, without removing the viscous matter with which it is covered when spun by the worm. It is simply woven as a thin gauze, then dressed with a thick solution of gum which in drying causes the threads partially to untwist, and thus gives a wrinkled and rough appearance to the fabric.

HARVARD COLLEGE, THE OLDEST IN AMERICA.

The first mention made in any act done, or intention formed in reference to a College anywhere, is in those of the Colony Records, under date of Oct. 28, 1636, viz; "The Court agreed to give £400 towords a School or College whereof £200 shall be paid next year, and £200 when the work is finished, and the next Court to appoint where and what building. The next year under the date of Nov. 15, 1637, the court passed the following order; "The College is ordered to be at Newtown", the name of which was changed May 6, 1638, to Cambridge as it was thought to be a more appropriate name for the place of such an institution. On Nov 20, 1637, twelve gentlemen (denominated a committee) were appointed to take order for a College at Newtown. These gentlemen managed the institution till a new appointment was made in the charter of 1642. College Book, No. 3, P. 2, says; Mr. Nathaniel Eaton was chosen Professor in 1637 and had the management of such edifices as were meet and necessary for the College and for his own lodgings. He was made a Freeman June 9, 1638. It was to this College under his administration than John Harvard bequeathed his library, and half his property (about £700,) in 1638, On the 13th, of March 1639, the Court passed the order: It is ordered that the College agreed upon formerly to be built at Cambridge, shall be called Harvard College. The adoption of this name is an implied admission on the part of the Court, that Mr. Harvard had entitled himself to be considered the founder, by making the first donation, though they had proposed, two years before to make a donation themselves towards the building, but it does not appear that it was ever done. Rev. John Harvard came over here in 1637, and was admitted a Freeman by taking the oath of allegience to the government under the first charter of the Massachusetts colony Nov. 2, 1637. He died at Charleston Mass. Sept. 14, 1638 of a disease contracted before he left England. The following inscription copied from the burying-Ground in Charleston May 18, 1849, from a plain granite shaft about twelve feet in height standing upon the most elevated part of the ground.

HARVARD.

On the twenty sixth day of September A. D. 1728, this stone was erected by the graduates of the University at Cambridge, in honor of the founder; who died at Charlestown on the twenty-sixth day of September, A. D. 1638.

There appears to be a discrepancy as to the exact date, both authorities claiming to be correct.

The records show that Mr. Eaton, Professor, as the head of the institution received, disbursed, and accounted for the principal part of Mr. Harvard's legacy to the College, in the erection of its first buildings. He left the College in the fall of I639.

The first person appointed under the title of President, was Rev. Henry Dunster M. A. who came to New England in 1649, and commenced his duties Aug. 27th. of that year. The first commencement was two years afterwards, Mr. Dunster was succeeded by Rev. Charles Chauncey, D. D. Nov. 27th. 1654, The succession of Presidents as follows: Rev. Leonard Hoar M. D. Sept. 10,1672; Rev. Uriah Oaks M. A. April 7, 1675; Rev. John Rogers M. A. April 10, 1682; Rev. Increase Mather D. D. June 11, 1685; Rev. Samuel Willard M. A. Vice Presi-

dent, Sept. 6, 1701; Hon. John Leverett M. A. January 14, 1707; Rev. Benjamin Wadsworth, M. A. July 7, 1725; Rev. Edward Holyoke M. A. Sept. 28, 1737; Rev. Samuel Lock D.D. March 21, 1770; Rev. Samuel Lagdon D. D. Oct. 14, 1774; Rev. Joseph Willard D. D. L. L. D. Dec. 19. 1781; Rev. Samuel Webber D. D. March 6, 1806; Rev. John Thornton Kirkland D. D. L. L. D. Nov. 14, 1810, Hon. Joseph Quincy L. L. D. Jan. 15. 1829; Hon. Edward Everett L. L. D. Jan. 3, 1846; Rev. Jared Sparks L. L D. Feb. 1, 1849; Rev. James Walker D. D. Feb. 10, 1853; Cornelius C. Felton, Feb. 16, 1860; Rev. Thomas Hill Oct. 6, 1862; Charles W. Elliot May 19, 1869; Dr. A. P. Peabody was acting President in 1868-69, during the interregnum between President Hill's resignation and President Elliot's election.

INDIGO.

Indigo has been used in India from a very early period, and was imported thence by the ancient Greeks and Romans, but was lost to Europe during great part of the middle ages. The cultivation of the plant and preparation of the dye were described by Marcho Polo in the thirteenth century. It was reintroduced by the Dutch about the middle of the sixteenth century. Its use in England, France and Saxony was then for a considerable time prevented by a strong prejudice against it, arising from the difficulty in fixing the color. Since this has been overcome, the cultivation of plants producing indigo, long confined to India, has extended to many other tropical countries. These plants generally belong to the genus *Indigofera*. The species of this genus number at least 150 and are natives of almost all tropical countries.

It is a half-shrubby plant, two to three feet high, with pinnate Caves, which have five or six pairs of long-obovate, dull, bluish-green leaflets and racemes of axillary pale red flowers.

In the process of preparation, the plant is macerated in water, fermentation takes place, the liquor becomes of a greenish color, and in due time is decanted, the coloring principle dissolved by the water absorbes oxygen from the air, and assumes a blue color, becoming at the same time insoluble, a gradual precipitation takes place favored by the addition of lime-water. The precipitated matter is then washed upon linen filters, then dried and shaped usually into cubical masses, for market.

Comparative Value of Coins.

In pursuance to the provisions of the Revised Statutes, H. C. Burchard, director of the mint, has estimated the values of standard coins in circulation, of the various nations of the world, which he has transmitted to the Secretary of the Treasury in the following form:

Country.	Monetary unit.	Value in U. S. Money.
Argentine Repub.	Peso*	$0.96.5
Austria	Florin†	.40.1
Belgium	Franc*	.19.3
Bolivia	Boliviano†	.81.2
Brazil	Milreis of 1,000reis	.54.6
British Poss. N. A.	Dollar††	1.00
Chili	Peso*	.91.2
Cuba	Peso*	.93.2
Denmark	Crown††	.26.8
Ecuador	Peso†	.81.2
Egypt	Piaster††	.04.9
France	Franc*	.19.3
Great Britain	Pound Sterling††	4.86.6½
Greece	Drachma*	.19.3
German Empire	Mark††	.23.8
Hayti	Gourds*	.96.5
India	Rupee of 16 annas†	.38.6
Italy	Lira*	.19.3
Japan	Yena*	.87.6
Liberia	Dollar††	1.00
Mexico	Dollar†	.88.2
Netherlands	Florin*	.40.2
Norway	Crown††	.26.8
Peru	Sol†	.81.2
Portugal	Milreis of 1,000 reis††	1.08
Russia	Ruble of 100 copecks†	.65
Spain	Peseta of 100 centimes*	.19.3
Sweden	Crown††	.26.8
Switzerland	Franc*	.19.3
Tripoli	Mahbub of 20 piasters†	.73.3
Turkey	Piaster††	.04.4
U. S. of Columbia	Peso†	.81.2
Venezuela	Bolivar*	.19.3

*Gold and silver. †Silver. ††Gold.

THE CHURCH AND SCIENCE.

For almost a century the enemies of the Church have been endeavoring to make her pass as the opponent of sciences and letters, as the enemy of all modern progress.

Here are statistics which prove that our principal scientific discoveries are due to priests and monks.

Judge of it.

We are indebted to St. Anatolius, Bishop of Laodicea, for the astronomical Canon of Easter.

To Dionysius the Little, a Scythian monk, for the cycle which bears his name, and which has fixed the beginning of the Christian era.

To Boetius, a priest, for pipe-organs, Artesian wells, hydraulic cements, and the first terrestrial sphere.

To Alcuin, a monk, for the astronomical classing of the planets.

To the Venerable Bede, for dactylonomy and the present form of the calendar.

To Guido, monk of Arezzo, for the musical bearing of the gamut.

To Roger Bacon for the telescope, the corrections of the Julian calendar, which Father Clavius, a Jesuit, completed later on.

To the priest Virgil [O'Fheargail (O'Farrell), Bishop of Salzburg], for the first assertion of the roundness of the earth and the existence of the antipodes.

To Vincent, of Beavais, a canon, for central attraction as the reason of the equilibrium of the earth in the midst of the atmosphere.

To Albertus Magnus for zinc and arsenic.

To Richard Warlingfort, abbot of St. Alban, for the first astronomical clock.

To the monk Gerbert, afterward Pope under the name of Sylvester II., for watches with wheels, the Madgeburg dial, the steam engine, and the importation of the decimal system which St. John Damascene had taught at Damascus, when he was professor to the great vizier, the terrible Abel Maleck.

To the Deacon Giosa for the magnet and compass.

To Spina, of the Order of St. Dominic, for spectacles.

To Basil Valentine, a monk of the same order (?), the first application of chemistry to medicine. ["Later on, Basil Valentine, a German Benedictine, distinguished himself by his many discoveries, and by his introduction of qualitative analysis into the study of chemistry."—*Rev. John A. Zham, C., S. C.*]

To Cardinals Cusa and Schombert, and to Forcarini, of the Order of Carmelites, for the assertion, before Galileo, that the earth revolves around the sun, which is motionless in respect to it.

To Father Guesmaz, a Portuguese Jesuit, for the construction of the first air-ship.

To Father Kircher, a Jesuit, for the magic lantern and the burning glass.

To the Cure Compagni for the art of cutting precious stones.

To the Abbe Chappe for the ærial telegraph.

To the Deacon Noller, of Pimpre, for having, two years before Franklin, explained storms by the presence of electricity in the clouds.

To the Abbe Lacaille for the spirit-level.

To Father Boscowil for the measurement of the equator of planets.

To the Abbe Girard Soulavie for the chronology of fossils.

To Mgr. Rendu for the motion of glaciers.

WILLS: TESTATORS AND EXECUTORS.

Directions for making a Will.—Every man having a wife or family should make his will. However small his estate, however remote may seem the probability of death, however confident that his property will pass to those he most wishes to benefit, it is an imperative duty in most cases, and is safer in every case, to protect the interests of the survivors by means of a will. When persons die intestate, having foolishly put off making a will until it is too late, their negligence may deprive those for whom they were most anxious, of the very benefits which had demanded a life-long struggle to provide. Thus a widow may find to her grievous disappointment that the estate, a life policy perhaps, or a small legacy, is not all hers, but has to be shared with distant relatives of her husband's, whose names perhaps she has never before heard. Or it may be a daughter who is left, and whose spendthrift husband (where the common law rule prevail as to the wife's personal property) becomes the legal possessor of the little fund intended for his wife's support. Instances might be multiplied in which negligence, or unreasoning dislike to making a will, become irreparable crimes against those who have the first claim to protection. If the estate consists of real as well as personal property, *i. e.*, of lands and houses as well as money and goods; or if the will is to contain many provisions, a lawyer should always be employed. Assuming that a lawyer is not employed, a person having resolved to make a will must not regard it as a light matter, to be got rid of in a few minutes like writing a letter, but one demanding the most serious attention. It is only after a person is dead, and can not explain his meaning, that his will can be opened to dispute. It is the more necessary, therefore, to express what is meant in language of the utmost clearness, avoiding the use of any word or expression that seems to admit of another meaning than the one intended. It is better to be prolix than to leave the smallest room for doubt or uncertainty, although the same name be repeated over and over again. Sounding phrases and carefully rounded periods are entirely out of place. Avoid the use of what may be thought "legal terms," when the same thing may be expressed in plain language. If in writing the will a mistake be made, it is better to re-write the whole. Before a will is executed, that is, signed by the testator in the presence of two or more witnesses, an alteration may be made by striking through the words with a pen, but opposite to such alterations the testator and witnesses should write their names or place their initials. Never scratch out a word with a knife or other instrument, and no alteration *of any kind whatever* should be made after the will is executed. If the testator afterwards wishes to change the disposition of his estate, it is better to make a new will revoking the old one, or to add a codicil to the first, which must be duly executed and attested in the same manner as the original will. Although, of course, forms of wills must vary to suit different cases, the following directions may be found useful to those who, in cases of emergency, are called upon to draw up wills, either for themselves or others:

Testator or Testatrix.—The person who makes the will is the testator, or if the will-maker be a woman the testatrix.

Estate.—By this word is to be understood property of all kinds, both real and personal. Real property includes such things as freehold lands and houses while personal property consists of money, house, furniture, goods, assurance policies, stock in private corporations, and the like.

Residuary Legatees.—It is well in all cases to leave to some person or persons "the residue of my estate and effects," although it may be thought that the whole of the property has been disposed of in legacies already mentioned in the will. It should be remembered that a will operates on all property acquired after it has been made.

To Begin a Will.—A form in which a will may be commenced is: "In the name of God, Amen. This is the last will of me, Thomas Smith, of——, in the county of ——, State of ——."

To End a Will.—After disposing of the property the will may be ended as follows: "And I revoke all former wills and codicils. Dated this —— day of ——, one thousand eight hundred and ——."

Execution of a Will.—The testator should sign his name at the foot or end of the will, in presence of two or more witnesses, who will afterwards sign their names in his presence, at his request, and, if possible, in the presence of each other; the testator declaring the will to be his last will and testament. A person who has been left a legacy in the will, or whose wife or husband has been left a legacy, should not be an attesting witness, husband and wife may both be witnesses, provided neither is a legatee.

Attesting Execution.—Opposite to or beneath the testator's signature should be written the attestation clause. The form of attestation should follow the requirements of the statutes operative where the will is executed. It is desirable that the addresses of the witnesses should be given, as they may possibly be wanted at some future time. If the testator should be too ill to sign, even by a mark another person may sign the testator's name to the will for him, in his presence and by his directions, and in this case it should be shown that the testator knew the contents of the document. Unless otherwise provided by statutes, the attestation clause, in such case, should be worded: "Signed by Thomas Brown, by the direction and in the presence of the testator, Thomas Smith, in the joint presence of us, who thereupon signed our names in his presence and in the presence of each other, the will having been first read over to

the testator, who appeared fully to understand the same." The person signing the testator's name should *not* be one of the witnesses. If by inadvertence the testator should have signed his will without the witnesses being present, then the attestation should be: "The testator acknowledged his signature already made as signature to his last will and testament in the joint presence," etc.

Codicil.—When some change is required to be made in the disposition of property as stated in the will, the change should be embodied in a codicil. A codicil should begin: "A codicil to my will, the said will bearing date," signed and witnessed with the same formalities as the will.

Executors.—Two or more executors may be appointed, although one is sufficient. The name and residence of each executor should be given in full as follows: "I appoint John Jones, of ——, and Edward Mathews, of ——, executors of this, my will." An executor may be a legatee under the will. Thus a child or wife to whom the whole or a portion of the estate is left may be appointed sole executor, or one of two or more executors. The residences of the witnesses need not be stated, if it is well known who are the persons intended.

Appointment of Trustees.—The form of appointment of executors will also serve when the estate is left in care of trustees except that the person must be designated "executors and trustees," in case the same persons are to act in both capacities. When the estate is wholly for the children, the will may read after the appointment of the executors and trustees: "I give and devise all my estate and effects real and personal, of which I may die possessed and entitled to, unto the said John Jones and Edward Mathews, upon trust, for my children, in equal shares, such shares to be paid or transferred to them on attaining the age of twenty-one years."

Revocations.—A will is revoked by a subsequent will—by marriage, or by burning, tearing, or otherwise destroying them.

Lapsed Legacies.—If a legatee dies in the lifetime of a testator the legacy lapses and falls into a residue, excepting only in cases where legatee is a child of the testator and leaves issue living at the testator's death.

To one Person Absolutely.—When it is the intention to leave all the property to one person, as for instance, a wife or child, the will may read: "I devise and bequeath all my estate and effects, real and personal, which I may die possessed of and entitled to, unto my wife, Mary Smith, absolutely."

To Children Under Age.—When estates are left wholly or in part to children under the age of twenty-one years, it is desirable to appoint trustees to hold the property in trust for those to whom it will ultimately belong. A wife may be appointed a trustee, or may be sole trustee.

Education and Maintenance of Children.—Executors may be empowered to apply the whole or part of the income arising from each child's share of the property to the child's education and maintenance.

To Wife for Life, and Then to Children.—In cases where the wife is to have the income arising from the property, and the children are to share equally in the property after their mother's death, it will be necessary to leave the estate in the hands of trustees. After appointing the trustees, the will may read: "To pay the income arising from my said estate and effects unto my wife for life, and after her decease I give and bequeath all my estate and effects, to be divided equally among all my children, absolutely."

Daughter's Sole Benefit.—When the whole or a portion of an estate is intended for the absolute and sole use of a daughter, to the exclusion of her husband's control or claim, it should be specified that the property so left, or if the property is in the hand of trustees, the income arising from it, is for "her sole and separate use, notwithstanding coverture, free from the control, debts, and engagements of any husband." This is not necessary in States whose statutes provide for such separate use; but the provision, by will, is a wise one at any event.

All Property to be Invested.—Executors and trustees may be empowered to sell and dispose of an estate, and, after the payment of all just debts and expenses, to invest the remainder as may be specified in the will.

BUSINESS LAW.

If a note is lost or stolen it does not release the maker, he must pay it if the consideration for which it was given and the amount can be proven.

A note or contract made on Sunday is void or voidable.

Notes bear interest only when so stated.

A note by a minor or a contract made with a minor is void or voidable.

A note obtained by fraud or from a person in state of intoxication cannot be collected.

The time of payment of a negotiable note must not depend upon a contingency. The promise must be absolute.

The loss of a bill or note is not sufficient excuse for not giving notice of protest.

The payee should be distinctly named in the note unless payable to bearer.

If the time of payment is not inserted it is held payable on demand.

A bill may be written upon any paper or substitute for it, either with ink or pencil.

It is a fraud to conceal a fraud.

Signatures made with a lead pencil are good in law.

A receipt for money is not always conclusive.

The acts of one partner bind all the rest.

No consideration is sufficient in law if it be illegal in its nature.

Checks or drafts must be presented for payment without unreasonable delay.

Checks or drafts should be presented during business hours, but in this country, except in the case of banks, the time extends through the day and evening.

If the drawee of a draft has changed

his residence the holder must use due or reasonable diligence to find him.

If one who holds a check as payee or otherwise transfers it to another, he has a right to insist that the check be presented that day, or at the farthest on the day following.

Principals are responsible for the acts of their agents.

An agreement without consideration is void.

Each individual in a partnership is responsible for the whole amount of the debts of the firm except in cases of special partnership.

An indorsee has a right of action against all whose names were on the bill when he received it.

An indorsement may be written on the face or back.

An indorser may prevent his own liability to be used by writing, without recourse or words to that effect.

Ignorance of the law excuses no one.

A contract with a lunatic is void.

"Value received" is usually within a note and should be, but is not necessary. If not written it is presumed by law or may be supplied by proof.

A note indorsed in blank (the name of the indorsee only written) is transferable by delivery the same as if made payable to bearer.

If the letter containing a protest of non-payment be put into the postoffice, any miscarriage does not affect the party giving notice.

Notice of protest may be sent either to the place of business or of residence of the party notified.

A loss of a bill or note is not sufficient excuse for not giving notice of protest.

If two or more partners are jointly liable on a note or bill, due notice to one of them is sufficient.

All claims which do not rest upon a *seal of judgment* must be sued within six years from the time when they arise.

If when a debt is due the debtor is out of the State the "six years" do not begin to run until he returns. If he afterward leave the State the time forward counts the same as if he remained in the State.

Except in the case of absence from the State the "six years" begin when the bill or account is due. In case of note they count from the "three days of grace." In case of a note on demand they count from the time of the demand.

The Statute of Limitations does not avoid or cancel the debt, but only provides that no action in law may be maintained after a given time. The Statute does not affect the collateral security.

Written instruments are to be construed and interpreted by the law according to the simple, customary and natural meaning of the words used.

The finder of negotiable paper, as of all other property, must make reasonable efforts to find the owner before he is entitled to appropriate it for his own purpose. If the finder concealed it he is liable to the charge of larceny or theft.

Joint payees of a bill or note who are not partners must all join in an indorsement.

After the death of a holder of a bill or note his executor or administrator may transfer it by his indorsement.

The husband who acquires a right to a bill or note which was given to the wife either before or after marriage may indorse it.

Acceptances applies to bills and not to notes. It is an engagement on the part of the person on whom the bill is drawn to pay it according to its tenor. The usual way is to write across the face of the bill the word "accepted."



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